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OF THE

AMERICAN ASSOCIATION OF NURSE ANESTHETISTS

CONTENTS

IS THE SITUATION SERIOUS? 65

SOME GENERAL REMARKS ABOUT ANESTHESIA
W. H. Parsons, M.D. 66

ANESTHESIA FROM THE NEUROSURGEON'S POINT OF VIEW
C. D. Hawkes, M.D. 69

ANESTHESIA IN ABDOMINAL SURGERY FROM THE VIEWPOINT OF THE SURGEON
Warren H. Cole, M.D. 73

METABOLISM AND BASAL METABOLISM
Helen Lamb, M.A.A.N.A. 77

THE PHYSIOLOGY OF RESPIRATION
Richard R. Overman, Ph.D. 81

SCHOOLS OF ANESTHESIOLOGY—SYMPOSIUM 84

NOTES AND THE NEWS 93

ABSTRACTS 103

BOOK REVIEWS 106

VOLUME XV · MAY, 1947 · NUMBER TWO

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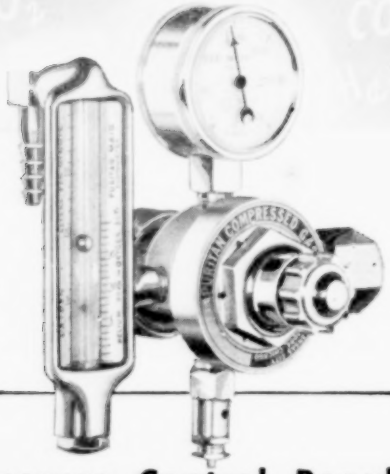

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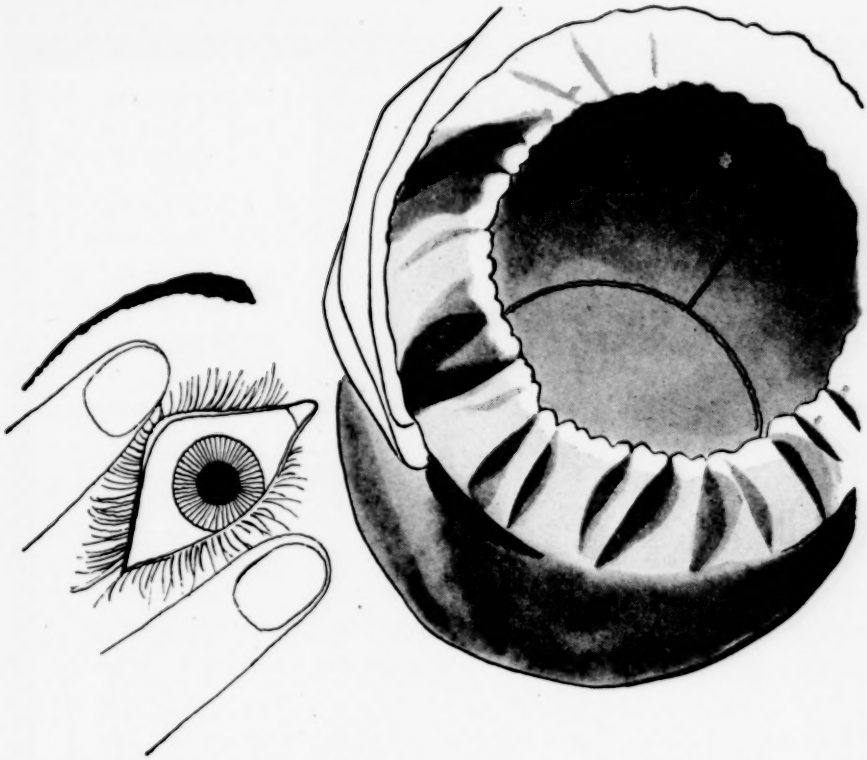

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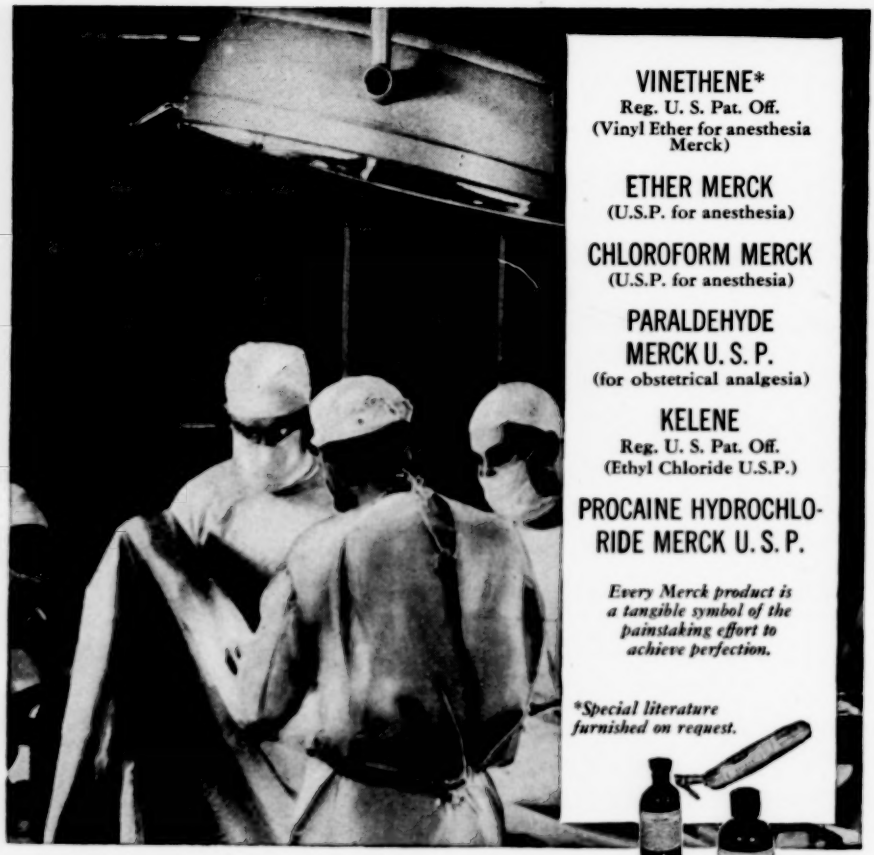

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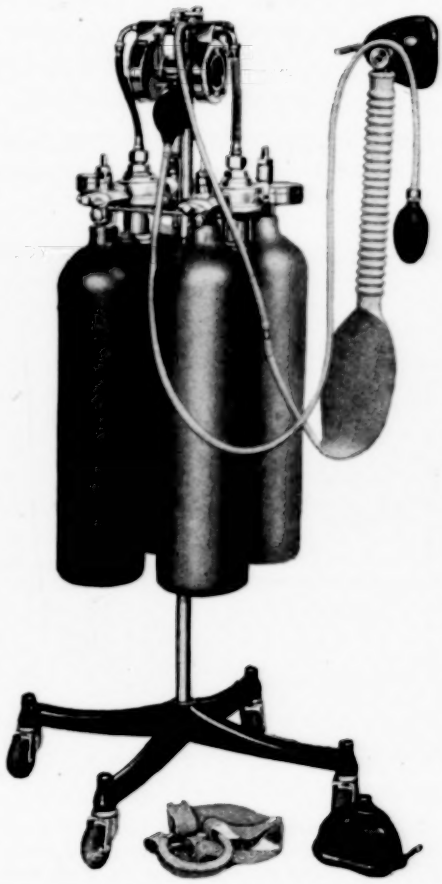

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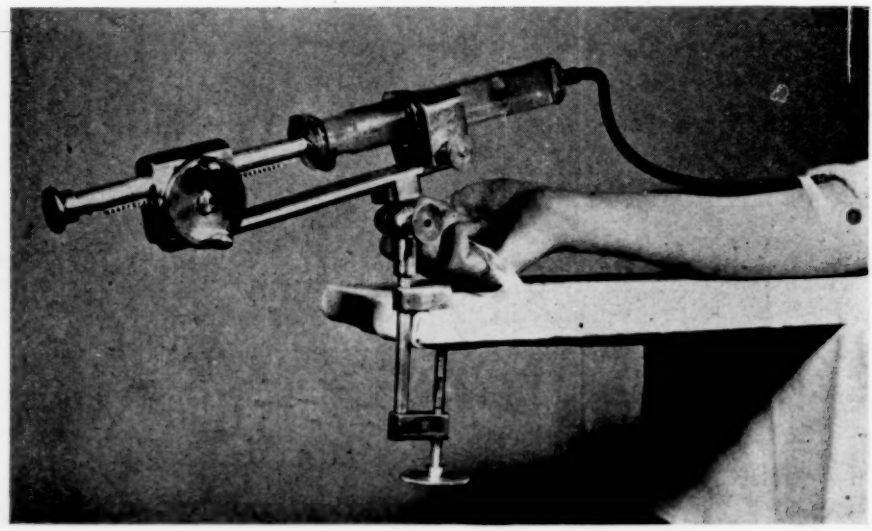

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The Journal of the American Association of Nurse Anesthetists

VOLUME XV MAY, 1947 NUMBER TWO

Is The Situation Serious?

Almost a half century ago, a young nurse was stopped in the corridors of the old Lakeside Hospital in Cleveland. "Come to see me tomorrow," she was told, "I'm going to make you an anesthetist." The man who addressed her was the great surgeon, George Crile, and the young nurse, Agatha Hodgins, was later to found the first school for nurse anesthetists under his direction. Even earlier, another nurse, Alice MaGaw, had been appointed an anesthetist at the Mayo Clinic. In the footsteps of these women, other nurse anesthetists followed to serve great surgeons throughout the country—Harvey Cushing, Evarts Graham, Claude Beck, and Alfred Blalock, to name only a few. Today, nurses are employed as anesthetists in approximately 96 per cent of the nation's outstanding hospitals, and the demand for the trained nurse anesthetist is still greater than the supply.

Recently, in the lay press, articles have appeared which have tended to disparage the contribution of the nurse anesthetist.[1] As is often true when a lay writer handles a professional subject, the facts have been distorted. Moreover, there is no evidence that these articles were either sponsored by, or motivated by pressure from, any professional group.

What is to be our answer to this unfortunate publicity? We do not wish to behave like the ostrich, nor do we wish to engage in fruitless rebuttal. The publication of such articles should certainly be discouraged. However, the positive answer to the challenge is to continue to improve the standards of the nurse anesthetist and to give the medical profession the same loyal service that has been given in the past, in order that the nurse anesthetist may receive the recognition she deserves. Recently, the contribution of the nurse anesthetist has been publically acknowledged by Evarts Graham and Frank Bradley, and Dr. Graham's viewpoint has been disseminated by the hospital press.[2, 3 4 5] For those who would challenge the position of the nurse anesthetist, there is an old saying that should someone "build a better mousetrap, the world will clear a path to his door."—G. F.

1. Will You Live Through Your Operation? Reader's Scope, Feb., 1947.
2. Graham, Evarts A.: Ether and humbug. J.A.M.A. **133**:97-109, Jan. 11, 1947.
3. Bradley, Frank R.: The challenge to the nurse anesthetist. J. Am. Assn. Nurse Anesthetists **15**:19-25, February, 1947.
4. A degree doesn't make an anesthetist. Mod. Hosp. **68**:49, Feb., 1947.
5. Nurses or physicians — who should give anesthesia. Hospitals **21**:81, April, 1947.

SOME GENERAL REMARKS ABOUT ANESTHESIA

W. H. Parsons, M.D.*
Vicksburg, Miss.

I am particularly pleased to have the opportunity to speak before the Mississippi Association of Nurse Anesthetists because, like all surgeons, I owe the nurse anesthetist a debt of gratitude. To do good surgery, one must have not only satisfactory anesthesia but also an anesthetist in whom one can place confidence. I would not operate unless the anesthesia were given by an expert. The unavoidable difficulties incident to surgery are quite enough in themselves without the additional hazards of poor anesthesia.

I am quite aware of the contention in many quarters that anesthetics should be administered only by graduate physicians having had formal training in anesthesiology. Perhaps that represents the ideal. But at the present time it is certainly not a practical possibility in most busy clinics and on many active surgical services. On the other hand, an untrained nurse should not be permitted to give an anesthetic under any circumstances.

Like many other surgeons, I know from experience that formally trained, widely experienced, and very competent nurse anesthetists do exist. They have great technical skill, they have a considerable knowledge of anesthesiology, they are capable of giving highly satisfactory anesthetics, and the nursing profession has every right to be proud of their accomplishments. I know whereof I speak, for, except for one or two brief intervals, I have had as my personal anesthetist for more than 10 years the same skilled anesthetist, and I rely very heavily upon her. During this time, we have worked together on several thousand operative procedures. She has come to know almost automatically the exact plane of anesthesia that I prefer for a given operation or for some special phase of an operation, and she supplies it without any direction from me. An anesthetist of that sort is as good for the patient as she is for the surgeon.

The induction and maintenance of adequate anesthesia make it possible for the surgeon to have the initial desideratum of successful surgery, adequate exposure of the operative field, and the second desideratum, a fully relaxed patient who is not straining against him. These results are secured by complete co-operation between the surgeon and the anesthetist, which implies an understanding by the one of the problems of the other. The surgeon, busy with a mass of technical details and often confronted with the necessity of making immediate and important and sometimes life-dependent decisions, must be free from the worry incident to the details of anesthesia. The anesthetist, on her part, must know enough of the principles as well as of the details of surgical procedures to understand what is required of her. It is well for the surgeon to have a reasonably intelligent understanding of the broad

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Read before the Mississippi Association of Nurse Anesthetists, Biloxi, Miss., Oct. 18, 1946.

*Chief Surgeon, Vicksburg Hospital.

problems of anesthesia, and he, on his part, must give the anesthetist his fullest co-operation. His greatest error—and, like all surgeons, I have been guilty of it—is to try to hurry the anesthetist and to begin the operation, in an effort to save time, before the anesthesia is sufficiently deep. In so doing, he defeats his own purpose. The exposure so desirable and essential cannot be achieved if anesthesia is incomplete, nor can exploration be carried out effectively without trauma if coils of protruding intestine obscure the vision and crowd the incision.

The surgeon who understands the problems of anesthesia will never be too engrossed in his own task or in too much of a hurry to heed the anesthetist when she reports the patient's condition or asks that the operation be halted until an anesthesia difficulty can be properly resolved. This is particularly true in thoracic surgery but may be true in any other operation, and serious consequences sometimes follow if the warning of the anesthetist is not heeded.

The history of anesthesia, or rather of attempted anesthesia, parallels the history of medicine, though it was only a century ago that the art, as we understand it, was translated into a practical reality. Many anesthetic agents have literally flowered for a day and then perished. In view of the large number of anesthetic agents tried in the past and found wanting and in view of the present voluminous literature on new agents and new methods, it is well to remind ourselves at intervals of the old saying that there are two classes of fools, the variety that thinks that because something is old it is good, and the variety that thinks that because something is new it is better. Neither point of view is correct. The selection of the anesthetic agent should be determined by the individual case and should not be a matter of routine. As a matter of fact, one of the oldest agents for the induction of anesthesia, ether, still has a definite and important place. I am reminded of that when I see my own anesthetist, faced with a difficult case, shift from one gas to another, until she has run the gamut, and then relax the patient with ether. Ether is no more to be derogated because of its ancient lineage than are the most recent products to be praised because they are of current vintage.

In my opinion, the two most important advances in anesthesiology during the last decade are the development and use of pentothal sodium and of curare. Pentothal sodium has been popularized, at least in part, because of its great usefulness under military conditions, but it has much to commend it as an induction agent in civilian surgery and as the sole anesthetic agent in special types of cases. Patients in whom anesthesia has been induced with pentothal sodium usually request, indeed demand, that it be used if additional surgery is required.

Intravenous anesthesia has great merit. Furthermore, it is a method that, from its introduction, has had a dramatic appeal to anesthetists, patients, and surgeons alike. We must be careful that this appeal does not work to the detriment of a useful method. We must bear in mind that neither pentothal sodium nor any other preparation or method is absolutely safe and free from risk. There is no such thing as "simple" anesthesia, any more than there is such a thing as "minor" surgery. The best

anesthetists and the best surgeons approach their tasks with a very wholesome respect for the possible risks in anything that they may do.

It would be particularly unfortunate if by improper use pentothal sodium should be brought into disrepute. The mere fact that thousands of anesthetics have been given safely by this method in the hands of untrained or relatively untrained personnel proves nothing at all as to its safety. I have no doubt that many unrecorded fatalities have resulted from its use; I am aware of some myself. Pentothal sodium should not be administered by an anesthetist inexperienced in its use, and in such an instance cyclopropane, or any other agent with which the anesthetist is familiar, is to be preferred.

Pentothal sodium is of low toxicity and has few remote effects. It induces anesthesia quickly and simply. However, unless a good airway can be obtained and maintained, the method is dangerous. It has certain other undesirable features: It readily produces respiratory depression, it cannot be given safely in large doses over long periods, it does not alone produce satisfactory relaxation, and it may lead to undesirably prolonged postoperative sleep. A good anesthetist can sometimes minimize some of these factors, but endless caution is necessary. Most observers believe that pentothal sodium is not a desirable or safe anesthetic in operations about the head and neck.

It is also well to remember that tolerances to pentothal sodium are widely divergent, and that the tolerance of the individual patient depends upon his status at the time the anesthetic is given. This agent is probably no more hazardous than any other when the patient is in shock. However, when it is administered to a patient in shock, the "average dose" of pentothal sodium (the existence of which is to be doubted) is no longer the proper dose or even the safe dose. The future of this agent I do not venture to predict, but I do say, with assurance, that its future will depend largely on the skill and care with which it is now being used.

As to curare, the unqualified statement may be made that this drug is an adjunct to, and not a substitute for, any other anesthetic agent. All surgeons performing abdominal operations demand of the anesthetist that the patient should have complete muscular relaxation. Only a surgeon who has been forced to perform a very intricate procedure on the common duct in a straining, unrelaxed patient knows how fearfully handicapped he is. The hospital records show how the morbidity and mortality mount under such circumstances. Yet even the most skilled anesthetist cannot always produce the desired relaxation. In the occasional case of this kind, curare, administered in the proper dosage and with the proper precautions, may convert a well nigh insuperable task to one that is relatively easy to accomplish.

The dose of curare administered should always be small. Not more than 5 cc. should be given for any single operation, and 2 or 3 cc., even for a large robust person, is more desirable. If an overdose should be given, the emergency could be met by artificial respiration and the administration of oxygen and prostigmine. Fortunately, I have had no such accident, and with proper care I do not believe that it

(Continued on page 83)

ANESTHESIA FROM THE NEUROSURGEON'S POINT OF VIEW

C. D. Hawkes, M.D.*
Memphis, Tenn.

The late Harvey Cushing, who was foremost in the development of neurosurgery in this country, if not in the world, performed most of his operations with the patient under local anesthesia. Indeed, until 15 years ago most neurosurgeons used this method. However, with improvement in agents and technics for general anesthesia and with the increase in scientific knowledge and skill of anesthetists in the last two decades, there has been an increasing tendency among neurosurgeons to perform operations with the patient under general anesthesia. This spares the patient considerable discomfort and fatigue, if not actual pain, and makes possible better relaxation and positioning of the patient, which add to the ease and efficiency with which the operation can be performed.

The neurosurgeon has come to depend upon the anesthetist, however, for much more than keeping the patient asleep. In most cases, and rightly so, the anesthetist takes over the supportive treatment of the patient during the operation, although the surgeon has the final responsibility and should be kept informed of the patient's condition at all times. If his anesthetist is well qualified to administer fluids intravenously, and even blood and stimulants as required, as well as to recognize impending shock and other physiologic changes which must be treated if the patient is to survive the procedure in the best possible condition, the neurosurgeon is relieved of a certain anxiety and concern about the patient's condition and is able to concentrate more fully on the details of the operation. During the removal of a very vascular brain tumor, the neurosurgeon may go through a harassing few minutes to control vigorous bleeding. In the pause after he has the hemorrhage momentarily under control, it is much easier to have the anesthetist report that blood pressure has fallen and that a transfusion has been started than to have to ask what the blood pressure is, find that it has fallen considerably, and then order a transfusion.

The anesthetist should be as much a part of the neurosurgical team as the assistant or the scrub nurse. In order to perform extensive and necessary operations on the nervous system which may strain the resources of the body to the utmost for the patient to survive, the co-operation of every member of his team is essential to the surgeon. To illustrate the role the anesthetist should play under various circumstances, I shall enumerate some neurosurgical procedures in which his offices are of the utmost help. Because the anesthesia problems of peripheral nerve surgery are the same as those of

Read at the Mid-South Post-Graduate Nurse Anesthetists Assembly, Memphis, Tenn., Feb. 13, 1947.
*Assistant in Neurology and Neurosurgery, University of Tennessee Medical School.

other types of surgery of the extremities, surgery of the peripheral nerves will not be included in this discussion.

Craniotomies

With the tendency away from the use of local anesthesia in surgery of the brain, tribromoethanol in amylene hydrate, i.e., avertin, was widely employed as a basal anesthetic. Since this has to be administered in a single dose in relation to the patient's body weight, there is marked variation in effectiveness, particularly in a patient with increased intracranial pressure. The drug also acts as a respiratory depressant and therefore frequently causes untoward effects, particularly in patients with cerebellar lesions. For these reasons, avertin is now less frequently used, and ether given intratracheally or pentothal sodium given intravenously is much more widely employed in operations on the brain.

It was once thought that ether caused edema of the brain, but it has been found that this rarely occurs if a good airway is maintained with an intratracheal tube and adequate oxygen is administered. An adequate airway and oxygenation are also important in the administration of pentothal sodium, which is somewhat of a respiratory depressant. However, pentothal sodium has an advantage over avertin in that almost minute-to-minute control of the dosage and effects is possible. Smooth induction of anesthesia without a period of anoxemia is also important in preventing swelling of the brain.

During a craniotomy, then, the anesthetist should take particular care that a good airway and good oxygenation are maintained to prevent edema of the brain. Intravenous administration of fluids should be started at the beginning of the operation so that blood may be given quickly should it be required, and necessary stimulants should be at hand.

Laminectomies

In operations on the spine and spinal cord, the patient is frequently in the prone position. Therefore, many anesthetists and neurosurgeons believe that intratracheal anesthesia should be employed in these cases. However, this is not always necessary if room for good chest expansion is provided by properly supporting the thorax with sandbags on each side, if the abdomen is protected from compression by placing sandbags under the iliac crest and inguinal areas, and if the table is not broken beneath the abdomen. Positioning to avoid abdominal compression is particularly important since pressure interferes with movement of the diaphragm and therefore with respiratory exchange. In addition, compression of abdominal vessels results in engorgement of epidural veins in the spinal canal, which increases bleeding and thus makes the operation more difficult technically.

In the surgical removal of herniated intervertebral disks, a complete laminectomy is no longer considered necessary. In fact, only a small portion of the lamina on one side is rongeured away to expose each space at which a protruded disk may be present. As a result, the procedure is now usually performed in an hour or a little more and, when performed in the lumbar region, lends itself well to spinal anesthesia. Spinal anesthesia gives good relaxation of the spinalis muscles and makes good exposure possible when

these muscles are separated from the dorsal processes and the lamina of the vertebrae on one side only. However, certain precautions should be employed in the administration of spinal anesthesia for operations for removal of herniated lumbar intervertebral disks. First, tests for the presence of block should be made. A spinal anesthetic should never be given below the site of a block since the concentration of the agent may result in irreparable damage to the nerve roots. However, lumbar puncture for the administration of the spinal anesthetic is usually performed in the upper lumbar region, and since most herniated disks occur at the fourth or the fifth lumbar space, this problem rarely arises. The report of the spinal fluid total protein should also be taken into account. A marked elevation indicates considerable irritation of the nerve roots, and they may react adversely to spinal anesthesia, with persistence of sensory and motor paralysis for a long time, if not permanently.

In laminectomies performed for the relief of pain by chordotomy or for resection of nerve roots, the requirements are the same as those for cord tumor. Likewise, for herniated intervertebral disks in the cervical region, at which level spinal anesthesia cannot safely be employed, the requirements are the same as those for other laminectomies.

In laminectomies, then, the important features from the anesthetist's standpoint are positioning to avoid interference with respiratory exchange, as well as compression of the abdomen, and the avoidance of spinal anesthesia in operations for herniated lumbar intervertebral disks when there is evidence of block or marked nerve root irritation.

SYMPATHECTOMIES

In the last decade and a half, a great deal has been added to our knowledge of the action of the autonomic nervous system. This knowledge has made possible the relief of symptoms of certain types of disease of the peripheral blood vessels, certain forms of pain from the internal organs, and even of symptoms of one dangerous form of high blood pressure by section of the proper sympathetic nerves. In dorsal sympathectomy for removal of the sympathetic supply to an upper extremity, the sympathetic chain in the retropleural space is approached by resecting the paravertebral portion of the third rib. The patient is placed in the prone position, and consequently from the standpoint of anesthesia the conditions are the same as those for laminectomy. In addition, the pleura is sometimes inadvertently entered, and the anesthetist must be prepared to provide positive pressure. In lumbar sympathectomy the sympathetic chain in the retroperitoneal space below the diaphragm is approached by either a flank or a lateral abdominal incision. This procedure therefore lends itself well to spinal anesthesia, which is of additional aid in exposure, since intestinal motility and distention are reduced.

The operation for treatment of essential hypertension requires every skill of the anesthetist as well as of the surgeon. In this operation the entire sympathetic chain from the region of the fourth or the fifth thoracic ganglion through the second lumbar ganglion, together with the great and

lesser splanchnic nerves, is resected. Both the retropleural and retroperitoneal spaces are widely exposed. Intratracheal anesthesia is therefore usually employed in order that positive pressure can be instituted if the pleura is entered. In addition, such extensive surgery on the autonomic nervous system is characterized by marked variations in the patient's physiologic state; particularly with the second stage of the operation, the blood pressure may fall to zero when the splanchnic nerves are sectioned. The anesthetist must be ready to administer fluid and blood, as well as a pressor drug such as neosynephrin, if the patient is to be brought safely through the procedure.

Diagnostic Procedures

In encephalography, i.e., the injection of oxygen or air by lumbar puncture into the ventricles and subarachnoid spaces of the brain, the use of intravenous pentothal sodium anesthesia has made this procedure much easier for both the patient and the surgeon. Formerly, when local anesthesia was employed, the patient experienced a great deal of pain when the air or oxygen entered the head and frequently vomited or fainted, making the procedure difficult to perform successfully in many instances. Now with the employment of pentothal sodium anesthesia, the injection of air can be carried out in a few minutes, and the patient is spared the discomfort. In addition, he sleeps away the worst part of the headache which ordinarily persists after encephalography for 24-48 hours. In administering pentothal sodium for this purpose, the anesthetist should take care that the anesthesia is not too deep; marked muscular relaxation when the patient is in the upright position causes slumping with angulation of the neck, and filling of the ventricles will not always be satisfactory. Pentothal sodium anesthesia is also frequently useful in ventriculography, in which the air is injected directly into the fluid spaces of the brain through a bur hole, and contributes to the comfort of the patient and the ease of performing the procedure. Care should be taken to use as little of the drug as possible for these purposes when a craniotomy is contemplated after ventriculography, in order to keep the total dosage required to a minimum.

Of increasing importance is the use of spinal or caudal anesthesia to determine preoperatively the probable lowering of blood pressure which can be obtained by sympathectomy in a hypertensive patient. By employing fractional methods, the sensory and autonomic fibers are blocked, but motor power is retained. By taking blood pressure readings during the period of action of the drug, a good estimate can be made of the effect which may be obtained by sectioning the sympathetic chains and splanchnic nerves in a person with hypertension.

Conclusion

In neurosurgery, the anesthetist can be of particular aid to the surgeon, and close team-work between the neurosurgeon and the anesthetist will result in the greatest benefit to the patient. I believe that no one has a keener appreciation of the anesthetist's skill or a keener realization of his role in making possible a successful operative procedure than the neurosurgeon.

ANESTHESIA IN ABDOMINAL SURGERY FROM THE VIEWPOINT OF THE SURGEON

Warren H. Cole, M.D.*
Chicago

Abdominal surgery requires skilful administration of the anesthetic because good relaxation is necessary and many of the operations are of great magnitude, putting considerable stress on the patient's reserve. Many surgeons and anesthetists adopt the philosophy of maintaining light anesthesia in abdominal surgery, but I doubt that this is the proper attitude; the trauma incident to strenuous traction is damaging to the wound locally and to the patient generally. More important is the fact that inadequate exposure, due to poor relaxation, may result in surgical errors which may actually jeopardize the patient's life. In other words, the surgical complications resulting from light anesthesia are more serious than the postoperative complications resulting from deep anesthesia.

Need for Co-operation Between Anesthetist and Surgeon

The need for close co-operation between the anesthetist and the surgeon is perhaps greater in abdominal surgery than in any other type of surgery, with the possible exception of thoracic surgery. Since many of the patients are poor risks to begin with and since the operation is frequently long and requires considerable manipulation, there is a great tendency for shock to develop some time during the operation. If the operation is to be of considerable magnitude, the anesthetist should be sure before the operation begins that a needle has been inserted into a vein for intravenous administration of fluids. It may not be necessary to give blood, but for operations such as intestinal resection routine blood transfusion is indicated. The anesthetist should keep the patient's welfare so well in mind that the surgeon is informed of any change in the patient's condition constituting an indication for the administration of blood. The surgeon should always be informed of any sudden drop in blood pressure or rise in pulse rate, because it may be necessary for him to terminate the operation to prevent jeopardizing the patient's life. Obviously, the surgeon must have as much advance notice as possible of any deterioration in the patient's condition so that he may plan the operation accordingly. It is not always possible to stop the operation on a moment's notice. Likewise, the surgeon should inform the anesthetist if the operation is going to be prolonged for an indefinite time.

The anesthetist must ask the surgeon if he intends to enter the thorax, since endotracheal anesthesia will be necessary if the pleural cavity is opened. If gastrectomy is being performed for a malignant lesion high in the stomach, the anesthetist should assume that the thorax may be entered and plan

Read at the Mid-South Post-Graduate Nurse Anesthetists Assembly, Memphis, Tenn., Feb. 12, 1947.

*From the Department of Surgery, University of Illinois College of Medicine.

the anesthesia accordingly at the beginning of the operation.

Premedication

Morphine remains the classic drug for sedation preceding operation. Atropine is being supplanted by scopolamine except for children and the aged. Scopolamine is superior to atropine because it counteracts the respiratory depression caused by morphine, induces amnesia, and minimizes nausea. It is less desirable than atropine in children and the aged because the dose of scopolamine required to depress the secretion of mucus and vagal transmission may be toxic to these patients.

Without considering dosage of the various drugs or agents in detail, I wish to discuss specifically the premedication of infants, particularly for operation for pyloric stenosis. Since very little relaxation is required for a Rammstedt operation, local anesthesia may be used, but only after proper premedication has been given. Years ago we used morphine for premedication, but numerous barbital compounds are probably superior, since they control mental excitement with much less respiratory depression than morphine. For infants, we use 1/10-1/20 gr. seconal per lb. body weight. This must be given rectally because the obstruction is so pronounced that absorption of the drug given orally would be inconstant and unreliable. If the child is extremely malnourished, the dosage should perhaps be as little as 1/20 gr. per lb. body weight. With few exceptions, the children are quiet and do not struggle unless pain is inflicted. The area of the wound may be infiltrated with procaine, and since only a small incision is necessary to deliver a pyloric tumor, this type of anesthesia and premedication is entirely satisfactory.

Choice of Anesthetic Agents

All anesthetists are aware that one agent cannot be used for all types of patients or operations. An anesthetist must therefore be qualified to give innumerable types of agents. However, it is not necessary that he utilize all available agents, particularly since by doing so he will not become proficient in the use of any one. When more than one agent is satisfactory for a certain type of operation or problem, it is naturally advisable to use the agent most adaptable to the circumstances and not to change agents every few days.

Regardless of the type of anesthetic used, the patient's safety should always be paramount in the minds of the anesthetist and the surgeon. The patient's comfort may be considered second in importance. The comfort of the anesthetist and the surgeon are least important.

The type of agent utilized depends a great deal on the amount of relaxation needed and the duration of the operation. The anesthetist must realize that in abdominal surgery maximal relaxation is needed for wound closure. Maximal anesthesia and relaxation are likewise needed if the operation is being performed high in the abdomen around the cardiac end of the stomach or on the hilus of the liver with a stricture of the common duct.

The following data on various anesthetic agents are considered from the standpoint of the requirements of the operation.

Ether.—In abdominal surgery, gas-ether has certain advantages over other agents in that it affords good relaxation

and the anesthesia is fairly easily controlled. However, there are definite disadvantages to the use of ether. The patient's recovery from the anesthesia is slow, and ether vapor is irritating to the bronchi and induces secretion of considerable mucus, even though scopolamine is used in premedication. Pulmonary complications appear to be slightly commoner after ether anesthesia than after use of some other agents. Ether has a slightly toxic effect on the liver, although this effect is not so pronounced as that produced by chloroform.

Cyclopropane and Curare. — Cyclopropane alone is very unsatisfactory for anesthesia for abdominal surgery, largely because good relaxation cannot be achieved. It is satisfactory for minor abdominal operations, such as appendectomy performed through a McBurney incision, but it is inadequate for resection of the stomach, colon, etc., because in such operations good relaxation is necessary to the patient's safety. However, used with curare, cyclopropane is a fairly satisfactory agent, although it may be difficult to determine the exact dose of curare.

The great advantages of cyclopropane are that it can be administered with a high percentage of oxygen and induce anesthesia rapidly. Likewise, the patient's recovery from the anesthesia is rapid. I personally believe that cyclopropane is dangerous if the patient has had any type of cardiac arrhythmia, even though the heart rate may be regular at the time of operation. As stated previously, cyclopropane may not provide adequate relaxation, and considerable harm may result when traction with retractors is strenuous and exposure inadequate.

Spinal Anesthesia.—In my opinion, spinal anesthesia is not desirable if the patient is threatened with shock, has intestinal obstruction, or is senile. The tendency toward a decrease in blood pressure during and after spinal anesthesia is such that it should not be used for an operation on a patient whose blood pressure is likely to be unstable. The compensating vascular mechanism is so poor in aged persons that spinal anesthesia appears undesirable for abdominal operations on such patients, although it would be highly desirable for operations such as amputation of a lower extremity because the dose of the anesthetic need not be large. We use ephedrine intramuscularly to counteract the drop in blood pressure which is likely to occur after spinal anesthesia. The dose utilized by my anesthetists is about 25 mg. for an adult of average size; this dose is perhaps slightly lower than that utilized by other anesthetists.

Under most circumstances, we use pontocaine with dextrose for spinal anesthesia. In general, spinal anesthesia is not very satisfactory when the operation is being performed on the upper abdomen, since such a large dose of the anesthetic must be given that the danger line is approached.

Intravenous Pentothal Sodium.—The intravenous administration of pentothal sodium induces anesthesia rapidly, and recovery is rapid. However, the drug's action is so short that it is not satisfactory for anesthesia for abdominal surgery unless repeated doses are given. When adequate oxygen is given, relatively deep anesthesia can be achieved insofar as respiratory arrest is concerned. Pentothal sodium is comparatively safe for the patient with a cardiac

irregularity. As a preliminary to other agents, it is very useful in that the apprehension induced by the presence of a mask, smothering sensations, etc., can be eliminated before the ether or gas is started.

The continuous use of pentothal sodium for anesthesia deep enough to permit major abdominal operations requires more than average skill. However, I know several surgeons who use intravenous pentothal sodium anesthesia for all laparotomies and apparently have had no deaths or untoward reactions in a large series of cases. On the other hand, I personally am not convinced that pentothal sodium is as safe an anesthetic as gas-ether or cyclopropane and curare. Pentothal sodium may institute decided laryngospasm by enhancing the laryngeal reflex. Therefore, it cannot be used if there is any interference with the airway, either by the lesion or induced by the operation. The drug should probably not be given to asthmatics as a preliminary to the use of ether; it is relatively undesirable for persons with this disease, because both pentothal sodium and ether tend to produce laryngospasm.

Local Anesthesia.—Local infiltration of an anesthetic agent at the site of an incision in abdominal surgery produces anesthesia of the abdominal wall, but any manipulation of the intestines, or particularly of the mesentery, will be painful. Since relaxation is minimal or absent, no abdominal work of consequence is possible when local anesthesia alone is used. However, certain operations, such as anastomosis of the gallbladder to the duodenum in a patient who is a poor operative risk, can be performed when local anesthesia alone is used.

Regional anesthesia of the intercostal type is superior to local infiltration because anesthesia and relaxation of the rectus and other abdominal muscles can be achieved if the injection is properly carried out. However, anesthesia of this type is confined to the abdom-

(Continued on page 92)

CALENDAR OF COMING EVENTS

May 5-7	**Tri-State Nurse Anesthetists Assembly, Chicago**
May 12-16	**International Council of Nurses, Atlantic City**
May 15-16	**Annual Meeting, New Jersey State Association of Nurse Anesthetists, Hotel Dennis, Atlantic City**
May 15-16	**Arkansas State Association of Nurse Anesthetists, Little Rock**
May 16	**Annual Meeting, Minnesota Association of Nurse Anesthetists, Radisson Hotel, Minneapolis**
May 26-30	**Institute for Nurse Anesthetists, Hotel Jung, New Orleans**
June 2-3	**Annual Meeting, New York State Association of Nurse Anesthetists, Hotel Pennsylvania, New York City**
September 22-25	**ANNUAL CONVENTION, AMERICAN ASSOCIATION OF NURSE ANESTHETISTS, St. Louis**
Oct. 13-17	**Annual Meeting, American Dietetic Association, Philadelphia**

METABOLISM AND BASAL METABOLISM
Their Significance in Anesthetic Administration

Helen Lamb, M.A.A.N.A.*
St. Louis, Mo.

Metabolism

Metabolism may be defined as "the sum total of the physical and chemical processes that are associated with the maintenance of life in the animal organism." Metabolism may be divided into two groups of reactions: (1) anabolism, or the building up of tissue elements for use or storage, and (2) catabolism, or the breaking down of tissue elements into simple materials for systemic use.

Foods that have been ingested are eventually absorbed from the intestine and are then oxidized to produce materials that supply energy for tissue activity (muscular, nervous, secretory energy, etc.), to supply heat, and to build new tissue elements (the synthesizing of proteins, fats, carbohydrates, etc.). The formation of these energy substances is called anabolism.

When these tissue elements are broken down into simpler forms for systemic utilization (as when during fasting fat is withdrawn from the cells in which it is deposited and used as a source of energy), that phase of metabolism is called catabolism.

Howell briefly defines anabolism as "energy storage" and catabolism as "energy dissipation" in the form of work or heat.[1]

Since heat is produced during all cellular activity, the heat production of an organism is intimately related to, and is a measure of, its metabolism. One method of determining the metabolic rate (energy requirement) of an animal is to measure accurately the total amount of heat produced by the total organism during a given period. The apparatus for heat production determinations is called a calorimeter. A simpler method of determining metabolic rate consists in determining the amount of oxygen consumed by a person during a given period. This method is less accurate but is better adapted for clinical use than the calorimeter method.

The rationale of using oxygen consumption as an indicator of metabolic rate is that almost all body heat is produced by the combining of nutritional material with oxygen, i.e., the oxidation of foodstuffs in the body; therefore, the amount of oxygen consumed may be regarded as a measure of the amount of heat produced. The apparatus employed for making this type of determination is called a metabolimeter.

Basal Metabolism

The term basal metabolism is used to describe the rate of energy transformation, i.e., the energy requirement, in an animal organism during its minimal awake activity—at as nearly complete rest as possible and while the organism is subsisting on its own food stores. It represents the amount of ox-

*Director, School of Anesthesia, Barnes Hospital.

1. Howell, W. H.: *Textbook of Physiology*, edited by Jno. F. Fulton (Philadelphia: W. B. Saunders Co., 1946).

idation taking place while the fires of the body are banked, or, as one writer puts it, "the calories being used to run the machine, when no work is being done by it." It is not to be regarded as the lowest possible rate of energy exchange, because during sleep heat production falls approximately 10-13 per cent below the basal level. For this reason, basal metabolism may be measured only while the subject is awake.

In man, this determination is made not earlier than 12 hours after ingestion of the previous meal and while the person lies perfectly still in a comfortably warm room, so that voluntary muscles, other than those of respiration, are entirely at rest and have been so for half an hour. The meal eaten at least 12 hours previously has been digested and assimilated, and no energy is being used to perform external work. Very little energy is being used to build new tissue. Metabolism is reduced to the maintenance of circulation, respiration, etc., the general equilibriums of vital processes, and of a constant body temperature. The minimal energy requirement is being furnished by oxidation of stored substances, and the person is said to be in a basal state, his rate of heat production being termed his basal metabolic rate.

As has been said, the basal metabolic rate of heat production is usually stated clinically in terms of its corollary, the basal metabolic rate of oxygen consumption. According to Guedel, the curve of cell oxygen demand parallels that of metabolism.[2] Although this figure is a less precise gage of metabolic activity than is an actual laboratory measurement of heat production, the results are adequate for diagnostic purposes, which merely compare them with an average rate of metabolic activity that has been established by the study of large groups of similarly typed persons.

For persons of similar age, the basal metabolic rate (heat production and therefore fuel requirement of the body) is proportionate to the surface area of the body and not to body weight. For a normal male, aged 20-30, the average basal metabolic rate is 40 calories of heat per hour per square meter body surface. After age 30, the basal metabolic rate slowly declines. During the period of early growth, around age 5, a much higher basal metabolic rate prevails. The basal metabolic rate of females is approximately 10 per cent lower than that of males.

Tables of standard or average basal metabolic rates, determined by various technics, have been published by different investigators from time to time. The following tables, compiled as one, are illustrative.

The Boothby, Dunn, and Berkson study is probably as comprehensive as any that has been made to date.

For clinical purposes, a person's basal metabolic rate is expressed in terms of per cent above or per cent below the average for his sex and age group. "Plus 16" indicates that the subject's basal metabolic rate is 16 per cent higher than the average for his sex and age group. "Minus 16" indicates that the subject's basal metabolic rate is 16 per cent lower than the average for his sex and age group.

Although this means of expressing a subject's metabolic activity is simple and convenient and adequate for clinical purposes, it is less precise than the

2. Guedel, Arthur: *Inhalation Anesthesia* (New York: The Macmillan Co., 1937).

AVERAGE BASAL METABOLIC RATES
IN CALORIES PER SQ. M. PER HOUR FOR MALES[3]

Age in Years	Shimer, after Du Bois & Benedict, J.A.M.A. Nov. 29, 1924	Krogh Modification of Russell Sage Institute of Pathology (Aub-Du Bois) Standards	Boothby, Dunn & Berkson, Mayo Clinic Tables, 1936
Birth	35		
1	45		
5	48		
6	44		53
10	44		51
15	46	42.4	46+
20	41	38.2	42
30		36.5	40+
40		36.2	38
50		35.5	37
60		34.6	36
70		33.8	
80	35		

expression of basal metabolism in terms of heat production per se (in calories per hour) or in terms of liters of oxygen consumed per hour. For instance, the designation "normal basal metabolic rate" for an obese person merely indicates his normalcy in relation to his sex and age group. It fails to indicate the metabolic rate characteristic of all obese persons in his group, all of whom, by reason of their obesity (and concomitant increased surface area) evidence a higher than normal metabolic rate, which would be immediately apparent if his metabolic rate were expressed in terms of liters of oxygen per hour or calories per square meter per hour, rather than in terms of normalcy for his group.

SIGNIFICANCE OF METABOLISM IN ANESTHETIC ADMINISTRATION

Differences in patients' metabolic rates reflect corresponding differences in their need for oxygen for tissue oxygenation. This fact may be related to the administration of anesthetics. A patient with a metabolic rate as low as 35 calories, as a result of premedication, advanced age, or other causes, may require only 15 per cent oxygen in the respired mixture to satisfy his tissue metabolic needs, whereas a patient with a metabolic requirement as high as 50 calories or more, as a result of hyperthyroidism, another pathologic condition, or rapid growth, may require as much as 30 per cent oxygen in his respired mixture. Translated into terms of the clinical administration of an anesthetic by a closed carbon dioxide absorption method, the first patient might need only 250 cc. oxygen per minute, whereas the second patient might require 500 cc. oxygen a minute.

Such an increase in the oxygen content of a mixture can be made only at the expense of the anesthetic gas. Thus, merely as a result of the difference in metabolic rate, one patient could re-

3. DuBois, E. F.: *Basal Metabolism in Health and Disease* (Philadelphia: Lea & Febiger, 1936).

ceive an anesthetic mixture consisting of 85 per cent anesthetic gas and 15 per cent oxygen, whereas the other could receive not more than 70 per cent of anesthetic gas, because of the 30 per cent oxygen that would be required.

When potent anesthetic agents, such as ether, cyclopropane, and chloroform, are used, this high oxygen demand is not embarrassing. However, if a less potent agent, such as nitrous oxide, were used as the only agent, either an incomplete, light anesthesia or a distressing degree of anoxia would result.

Since oxygen demand and reflex irritability parallel metabolic rate, differences in metabolic rate are important in anesthesia since they represent fundamental differences in the amounts of oxygen required by different patients (1) for protection of vital life-sustaining metabolic processes and (2) to satisfy an increased metabolic rate that has been reflexly elevated by pain stimuli, which need must be fulfilled even though deeper narcosis may be indicated to inhibit the actuating pain stimuli.

These contradictory demands for full surgical anesthesia and at the same time for full oxygenation at the existing high metabolic rate may in part explain the clinical pre-eminence of the very potent anesthetic agents, ether and cyclopropane. They permit the conduct of deep surgical anesthesia and, at the same time, the provision of the wide margin of oxygenation required to protect the patient's vital metabolic processes.

Some authors consider the patient's basal metabolic rate the basis for selecting premedication as well as the anesthetic agent. Since emotional excitement due to fear, or muscular activity incident to emotional excitement, elevates the metabolic rate as much as 30 per cent according to Wiggers,[4] premedication is directed at reducing emotional excitement. Barbiturates have been suggested for premedication, but since the dose of a barbiturate necessary to depress metabolism is large, the doses usually used for premedication have little effect on a patient's metabolic rate.

Of the preanesthetic drugs in common use, opium derivatives are the most potent depressants of metabolism. They not only directly inhibit metabolism but also, by allaying pain, combat the elevation of the metabolic rate which would otherwise be caused reflexly. It has even been proposed that, instead of being determined routinely, the dosage of morphine be related to the metabolic rate, based upon the rationale that while ¼ gr. morphine might paralyze respiration in a patient with hypothyroidism and a low metabolic rate, the same dose would be insufficient for a patient with a high metabolic rate.

According to Cushny, basal metabolism in man is decreased about 10 per cent by therapeutic doses of morphine during the first hour after the injection is given.[5]

Opiates are destroyed in the body at a rate in proportion to the metabolic rate of the patient. A patient with a greatly increased metabolic rate, such as is sometimes seen in postoperative

(Continued on page 102)

4. Wiggers, Carl J.: *Physiology in Health and Disease* (Philadelphia: Lea & Febiger, 1946).

5. Cushny, Arthur: *Pharmacology and Therapeutics*, edited by Arthur Grollman and Donald Slaughter (Philadelphia: Lea & Febiger, 1947).

THE PHYSIOLOGY OF RESPIRATION

Richard R. Overman, Ph.D.*
Memphis, Tenn.

The respiratory epithelium of the lungs is to the mammal what the surface membrane is to the protozoan organism—the exchange barrier of respiratory and anesthetic gases. The altered mass-surface ratio in the metazoans has made mandatory a specialized mechanism for gaseous exchange.

The acquisition of oxygen and the removal of the waste gas, carbon dioxide, are no more critical than the acquisition of food and water and the renal removal of other wastes. However, the mammal has no storage mechanism for metabolic gases such as it has for its food, water, and solid waste materials. Consequently, oxygen must be taken in and carbon dioxide removed by a constant, intermittent, automatic process. The control of this process is one of the most fascinating mechanisms of mammalian organization and is most important to the anesthetist.

The respiratory epithelium itself has limited vital properties with regard to gaseous exchange, and consequently the mechanisms of breathing are principally those affecting the intermittent exposure of this epithelium to the environment. Alternate inspiration and expiration are brought about by alternate contraction and relaxation of striated musculature, which, in turn, repeatedly enlarges and reduces the volume of the thorax. Since the lungs, by reason of their elasticity, passively follow changes in thoracic volume, new air is intermittently exposed to the respiratory epithelium where oxygen, carbon dioxide, and anesthetic gas exchanges occur between air and blood.

Even before it was known that the contraction of all striated musculature is the result of nervous impulses, the control of the brain over respiration was postulated. Galen described death from respiratory failure after section of the spinal cord just below the foramen magnum. However, knowledge of the intimate localization of the neural respiratory mechanisms and of their central and peripheral control has been had only relatively recently.

The central neural mechanisms of respiration are located (1) in the medulla and (2) in the anterior portion of the pons. The more important medullary portion possesses a tonic inspiratory activity, which must be intermittently inhibited to produce passive expiration. This intermittent inhibition may arise from either of two sources: (1) from afferent impulses to the medullary center from the inflated lungs and (2)from the more rostrally located pneumotaxic center in the pons. Thus, the rhythm of respiration is conferred upon the respiratory center by reflexes. Furthermore, owing to its diffuse character and its location in the reticular formation, the medullary respiratory center may be reflexly influenced by stimulation of almost any sensory nerve in the body. Inspiratory, gasping respiration

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*Assistant Professor of Physiology, University of Tennessee, College of Medicine.

which appears upon strong sensory stimulation from trauma, such as occurs in surgery, or from less severe stimulation, such as occurs on stepping into a cold shower, is due to reflex stimulation of the medullary inspiratory center. Likewise, reflex production of laryngospasm and bronchospasm is a common concomitant of surgical trauma.

The medullary center in the conscious subject is also capable of volitional control. One can produce volitional apnea or volitional hyperpnea at will. However, conscious control of respiration disappears entirely with onset of the state of anesthesia. Inhalation agents cause an ascending paralysis of the spinal cord. This means that the intercostal muscles supplied by the thoracic cord are paralyzed before the diaphragm with its cervical innervation. During deepening anesthesia the lower, then the upper, intercostal muscles and finally the diaphragm lose their activity and tone; during recovery from deep anesthesia, these muscles recover in reverse order. Observation of the comparative activity of these two groups of muscles gives us one of the most important respiratory signs.

Concomitant with ascending cord paralysis, depression of the brain progresses from its most specialized to its least specialized centers. The cerebrum is depressed first with loss of judgment and reason followed by loss of memory and consciousness. With regard to the special senses, hearing remains intact longest and recovers first. The cerebellum then shares in the depression as is evidenced by the ataxia of the second stage. Objective signs of further depression are not obvious but progress downward through the thalamus, midbrain, and medulla. Severe medullary depression indicates approaching irreversibility of the anesthesia.

With loss of conscious control, respiration becomes machine-like, and variations in rate and depth depend entirely upon chemical and/or reflex changes produced by the anesthetist or surgeon. This unconscious control depends upon balances between the depth of anesthesia, the degree of trauma, and the oxygen and carbon dioxide content of the blood from moment to moment. The chemical aspects of this control may be divided into two groups: (1) those chemical changes which affect the respiratory center directly and (2) those chemical changes which affect the respiratory center reflexly.

In the first group there are three principal factors: (1) the degree of depression of the central neurons by the anesthetic agent, (2) the degree of depression of the central neurons by oxygen lack, and (3) the concentration of carbon dioxide in the center. The descending depression of the brain by an inhalant anesthestic has been discussed. With respect to the second factor, any degree of anoxia is depressant to the central neurons. With respect to the third factor, an increase in carbon dioxide will produce hyperpnea, whereas a decreased tidal volume accompanies a relative acapnia.

What of those chemical influences which affect the center reflexly? It may be said that, when the respiratory center is abnormally depressed by drugs or by anoxia, the site of automatic control is shifted to the peripheral chemoreceptors, particularly the carotid bodies located at the bifurcation of the common carotid arteries and connected to the respiratory center by the afferent carotid sinus nerve. These peripheral chemore-

ceptors serve as safety mechanisms in the face of central respiratory depression, for they are stimulated by the very agents which depress the central mechanism, i.e., by anesthetic drugs and poisons, by anoxia, by abnormally high concentrations of carbon dioxide, and by acidity.

The end result of stimulation of the peripheral chemoreceptors is the same as that of stimulation of the center itself, i.e., increased depth of respiration and improvement in tidal volume. Upon stimulation, the peripheral chemoreceptors, through afferent impulses, are capable of driving the otherwise depressed central mechanism and, through this drive, maintain rhythmic breathing.

Thus, in states of central neural depression, when the driving force of respiration has shifted to the carotid bodies, low oxygen tension becomes the main respiratory stimulant. Administration of excess oxygen under these conditions will cause a period of apnea until either the low oxygen stimulus recurs or the carbon dioxide tension rises above the respiratory center's threshold.

However, the importance of the role played by these peripheral, chemically mediated reflexes lies not in their sensitivity to factors normally regulating breathing, but in their ability to withstand and respond to adverse circumstances which seriously impair the functional capacity of the central neurons. By this means the chemoreceptors are able to set up a powerful reflex drive and thus maintain the activity of the central neurons when they would otherwise cease to function.

These facts regarding the emergency control of respiration are important, since it is an error to presuppose a normal respiratory center in the surgical patient. Although sometimes stimulated (by pain or fever), the respiratory center is most often depressed, and its threshold to stimuli is raised because of drugs used or because of abnormal metabolism arising from the patient's illness. In order of frequency, the most common respiratory depressants in surgical patients are (1) the anesthetic agent, (2) premedication drugs, (3) oxygen lack, and (4) marked carbon dioxide excess. The production of oxygen lack or carbon dioxide retention is as inexcusable as an overdose of a premedicating drug or anesthetic agent.

"There are three persons of paramount importance in the conduct of anesthesia: the patient, the anesthetist, and the surgeon. The most important, but also the most variable, is the patient. He becomes less unpredictable the more the surgeon and the anesthetist know about his disease and how it affects him as a whole."[1] Moreover, the anesthetist cannot properly evaluate the patient unless she possesses a working knowledge of physiology in general and respiratory physiology in particular.

REMARKS ABOUT ANESTHESIA

(Continued from page 68)

need occur. This agent, like pentothal sodium, is of value and should not be misused. It is not a substitute for efficient anesthesia, nor is it a short-cut to relaxation; it is a last resort.

In closing may I express my gratitude, the gratitude that all surgeons must feel, to the anesthetists who make the specialty of surgery possible and as simple as it ever can be.

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1. Apgar, Virginia, and Foote, Ellen B.: *Notes on Anesthesia* (New York: College of Physicians and Surgeons, Columbia University, 1943).

SCHOOLS OF ANESTHESIOLOGY

Symposium

EVALUATION OF HIGH SCHOOL AND SCHOOL OF NURSING TRANSCRIPTS

Sister Helen Marie Hughes, M.A.A.N.A.*
Detroit

School transcripts and other data presented by candidates for advanced study are painstakingly gathered. Yet often there is complete failure to analyze the standards represented. Consequently, there is a need for each committee on admissions to set up criteria and evaluate high school, college, and school of nursing records according to accepted norms.

In evaluating the high school record of a candidate for admission to a school of anesthesiology, the program of studies should be analyzed first. Have the proper subjects been studied in the correct sequence and for the minimum time? Then the candidate's scores should be scrutinized for her standing. Is it high, average, or low? Also of significance is her rank in class in relation to the size of the class and the scores received.

Attention should next be paid to the candidate's intelligence rating. If the intelligence rating is not recorded on the transcript, the high school may not have used this measuring device. Again, its omission from the transcript may be an oversight, and the information is important enough for a specific request to be made for it.

Teacher preparation is indicated by the size of the class and whether the school is accredited, as well as by the school's policy with regard to intelligence tests, scoring, and the program of studies. In normal times, an accredited high school is able to secure teachers well prepared by education and natural ability. Lack of accreditation casts doubt on the preparation of the teachers. Since the school of nursing may have accepted the candidate from a nonaccredited school, it may be necessary to request the standing of the high school from the state department of education. Students should not be admitted from nonaccredited schools.

A valuable criterion, but one that cannot always be applied, is whether the candidate has been accepted by an accredited college or university and has at least a C standing on the college transcript.

In the final analysis of the high school transcript, the candidate should be acceptable if (1) she has at least 10 credits in major fields of study, (2) the school is of average size as indicated by the number in the graduating class, (3) the school is accredited and approved by the state department of education, (4) a recognized intelligence test is used, and (5) teacher preparation is adequate.

In judging transcripts from schools of nursing, the criteria differ somewhat from those used in judging the high school record of the candidate. Most examiners of state boards of nursing request that the school of nursing accept students from the upper third of the high school class only. Although this is the written policy of most schools

*Director of Department of Anesthesiology, Mercy College, Mount Carmel Mercy Hospital.

of nursing, it is not consistently followed. Schools of nursing records show the acceptance of students from all levels of achievement in high school. This practice is a great educational weakness.

Also of importance to the committee on admissions of a school of anesthesiology is the preparation of the director of the school of nursing. Although in the United States degrees are evaluated far in excess of the dictates of common sense, if the director has a Bachelor's or Master's degree the teaching will usually reflect it.

The committee will also wish to know whether the school of nursing has been accredited by the National League of Nursing Education or the Catholic Hospital Association and whether the collegiate school of nursing attended by a candidate has been accredited by the regional accrediting agency.

Were the League's pre-nursing tests used in the selection of students for the school of nursing? This rating is very helpful in deciding borderline cases. The score made on the state board of nursing examination is also important. If the pool examination questions from the League were used, the findings will be more reliable. Correlating this score with the high school and the school of nursing record and scores made on intelligence and pre-nursing tests is well worth the effort.

In the final analysis of the school of nursing transcript, the candidate should be acceptable (1) if she was selected in conformity with the policy of the National League of Nursing Education, (2) if teacher preparation was dynamic as indicated by the director's degrees, and (3) if the state used the pool examination questions prepared by the League for the registration of nurses.

In any case, the evaluation of high school and school of nursing transcripts should be objective, care being taken to eliminate the factor of one's own personal opinion.

CRITERIA FOR ACCEPTING AND DISMISSING A STUDENT FROM A SCHOOL OF ANESTHESIOLOGY

Sister Rudolpha, M.A.A.N.A.*
Springfield, Ill.

In such responsible and highly scientific work as the practice of anesthesiology, standards for the acceptance of students cannot be too high. First of all, it is wise to establish norms for admission to schools and to review carefully the candidate's official transcript from her school of nursing, as well as information about her state of health. Also of primary importance are the candidate's recommendations, which should be evaluated by criteria based on objective norms or check lists rather than on subjective opinions. Recommendations should be secured from the candidate's former teachers and from physicians with whom she has worked, and their composite opinion of her character, personality, and ability should be used as a basis for judgment. A personal interview should be arranged if it is at all feasible, and discernment exercised in the final evaluation of the candidate's intellectual capacity, moral qualities, and psychologic characteristics.

It is always possible, however, that undesirable traits may become evident after the applicant has been accepted, and the question of dismissal must be considered. Dismissal of a student from a school of anesthesiology is a grave

*Director of Anesthesiology, St. John's Hospital.

matter; not only does it have repercussions in the life of the individual, but it also reflects on the internal organization of the school.

Seldom should a school of anesthesiology be faced with this problem, since students in postgraduate courses are presumed to be more mature than those in schools of nursing. It is also true that collapse in the moral life of an individual does not take place overnight, and executives and instructors need have no particular discernment to be aware of signs of an approaching storm. There are likewise indications of weakness in the intellectual endowment and emotional stability of the student before a breakdown occurs.

No one person should want the responsibility of making such a grave decision as the dismissal of a student. Moreover, there is wisdom in counsel. Hence, both the acceptance and dismissal of students should be passed on by an executive board composed of at least three members of the department and the hospital administrator. Not only the student's record but also the remote and immediate causes of the situation leading to dismissal should be carefully reviewed before a final decision is reached. Possible causes include a breakdown in health, inability to absorb knowledge necessary to an anesthetist, inability to assume responsibility, failure to live up to accepted moral standards, and evident inability to adjust to the environment and to co-operate with co-workers. If, in the final analysis, incompatibility is conclusive, dismissal must be pronounced. Schools of anesthesiology train persons to handle human lives, and the evidently unfit must not be permitted to attain the status of anesthetists.

Because of the stigma attached to dismissal from a school, the student must be given a chance to withdraw of her own volition, unless there has been flagrant violation of accepted standards. Also, in an instance of flagrant violation of standards, the student should not be recommended to another school. If there have been extenuating circumstances, however, recommendations with qualifications might be given.

The objective of a school of anesthesiology is to train responsible, capable anesthetists. Because of the great need for anesthetists, the school should do everything in its power to give a student the best of help, advice, and instruction. On the other hand, the school has a duty to society and to the profession not to jeopardize the profession by admitting to its ranks unfit and undesirable candidates.

AN EIGHT HOUR SCHEDULE FOR A SCHOOL OF ANESTHESIOLOGY

Eletta Engum Silver, M.A.A.N.A.
Union Grove, Wis.

It is possible for a school of anesthesiology to carry out an eight hour schedule efficiently. Few schools believe that students should have the experience of being on call while taking a course in anesthesiology. However, anesthetists should be able to adjust themselves to "on call duty" when they accept a position on completion of their course.

The advantages of an eight hour schedule, though not many, are outstanding: (1) Students are less fatigued when they are not on call; (2) hours for theoretical instruction may be planned on a well organized schedule, which may be followed through with

each individual class; (3) more efficient rotation of services is possible.

A 300 bed hospital conducting a school of anesthesiology on an eight hour schedule may be used as an example. Factors to be considered are (1) the number of students required to serve the anesthesia department efficiently; (2) the number of operating rooms, which will be assumed to be 10; (3) whether the service of the department includes obstetric anesthesia and the administration of therapeutic gases, and we shall assume that it does.

If the anesthesia department in such a 300 bed hospital is to be well organized on an eight hour schedule, 12 students will be required for the hours from 7:00 a.m. to 3:30 p.m., 2 from 3:30 p.m. to 11:00 p.m., and 1 from 11:00 p.m. to 7:00 a.m. In larger institutions three students may be required for the afternoon hours and two anesthetists for night service.

The admission of students and the length of the course are important factors in considering the advisability of establishing an eight hour schedule. I have found that a course conducted for nine months services this plan well. It may also be pointed out that a student graduating from a school conducting a course for a minimum of nine months will be more likely to receive college credit for her course in anesthesiology.

For a school of anesthesiology in a 300 bed hospital, seven students would be admitted each term. Students admitted in September complete the course in June, those admitted in January finish in October, and those entering in May are through in February.

A great advantage to this plan is that new students are in the school a month before the senior students are graduated and have an opportunity to become well oriented before working in surgery. During this time of preclinical training, the new students have classes in physiology, pre- and postoperative care, pharmacology, mechanisms of anesthesia, and anatomy. Moreover, older students are available to administer the anesthetics to difficult or poor risk patients. Gradually, the younger students are allowed to administer anesthetics for the more difficult cases, but only after they have observed the administration of spinal and local anesthetics for two weeks and are thoroughly familiar with the administration of ether, nitrous oxide-oxygen-ether, ethylene-oxygen-ether, cyclopropane, and sodium pentothal in this order.

It may be difficult to obtain the required number of students for an eight hour schedule to be carried out efficiently. A number of schools admit students every two months, and many applicants are anxious to begin the course immediately. This difficulty would be obviated if all schools had the same admission dates. On the other hand, should a student wish to leave the school, this deficit may not be made up for three months; whereas a school admitting students every two months has more control over this situation should it arise.

JOB ANALYSIS IN A SCHOOL OF ANESTHESIOLOGY

Sister Seraphia, M.A.A.N.A.*
Springfield, Ill.

In the business world, job analysis and job instruction are not new. During the war, when the army and navy and industry had to train men quickly,

*Assistant Director, School of Anesthesiology, St. John's Hospital.

the value of job analysis was effectively demonstrated. With this example before them, leaders in the medical profession and hospital supervisors might well develop methods for getting assigned duties done accurately and on schedule by both professional and nonprofessional personnel. The first requirement is good leadership. A supervisor not only must have faith in the organization and its policies but must be both willing and eager to discharge responsibilities faithfully.

For job instruction within a department of anesthesiology to be successful, the supervisor should know her job thoroughly. In addition, she should familiarize all personnel working with her with the small details. This aspect of training is often neglected. Frequently, in the rush of getting persons trained when there is work to be done, the supervisor fails to give the student pointers which will assure efficiency on the job. These knacks, or operations within a job, which the supervisor has learned through experience, are never written in textbooks. However, it is these knacks learned through experience that she, as a supervisor, must pass on if the anesthetists she trains are to be competent.

In making a job analysis, an initial and essential step is to prepare a complete list of all positions in the department. In order that the description of both positions and jobs may be clear, the terminology used should be correct. Beginning with the supervisor, who holds position no. 1, position numbers are assigned to each member of the staff. A chart describing each position is then made and is headed with an introduction defining the qualifications for the position. This preamble may be useful in a later evaluation of the position, as well as helpful to the hospital administrator. Next the jobs under each position are grouped under headings such as supervision, administration, and teaching. These general headings are placed on the left of the chart, and an analysis of each and of the individual jobs under it is placed opposite.

Job breakdowns are then made for each job which needs explanation. Sometimes a preamble is all that is necessary. In making a job breakdown, the first step is to determine what one is working with and what is to be done with it, e.g., for a breakdown on the job of testing anesthesia machines, machines would be the *part* and testing the *operation*. The important steps taken in doing the job are listed in proper sequence on the left (see Table). Opposite each step are then listed the key points for that step. These key points include knacks, tricks, special timing, and other special information.

The purpose of job analysis and job breakdown is to develop accuracy and speed. The instructor may use the breakdown in demonstrating any new procedure, and a student may use it, with the instructor's consent, in giving demonstrations. By this means, the student's performance may be quickly and accurately checked. However, with this method of training, as with all others, the basic principles of teaching must not be forgotten. The student must be placed in the proper frame of mind to receive instruction, the procedure must be presented with patience and tact, and the student's work must be checked regularly.

The following table is illustrative of the type which may be prepared in a job analysis.

Position No. 1 Job No. 8

Part: Set-up for intravenous administration of pentothal sodium. Operation: Prepare for use.

Preamble: In preparing a set-up for intravenous administration of an anesthetic, the anesthetist must use an aseptic technic. The intravenous route is the most delicate channel of administration.

IMPORTANT STEPS	KEY POINTS
1. Prepare table.	1. Tourniquet 2. Adhesive tape 3. Syringe holder 4. Pillow 5. Sufficient space
2. Procure sterile tray and remove outer wrapper.	
3. Wash hands.	1. Soap and water, followed by 2. Alcohol
4. Remove towel covering sterile equipment.	Keep inner surface sterile.
5. Place small towel from set on table on top of pillow and tourniquet.	Open fully.
6. Assemble syringe.	See that barrel and plunger numbers correspond.
7. Have pentothal supply jar and medicine glass filled with pentothal.	Use 2½% solution, freshly prepared.
8. Connect sterile tubing with adaptor to front end of stopcock.	Apply snugly.
9. Connect tubing with rubber stopper to side of stopcock.	Apply snugly.
10. Apply needle to glass observation tube.	Apply snugly.
11. Fill syringe with pentothal sodium.	Use 10 cc.
12. Apply Luer lock stopcock to Luer lock syringe.	Apply with scale upward.
13. Remove air from syringe.	Turn stopcock lever toward supply bottle; one-quarter turn to right.
14. Refill syringe.	
15. Remove air from tubing and needle to be inserted into vein.	1. Turn back stopcock lever; one-quarter turn to left. 2. Be sure needle is open. Handle carefully.
16. Place syringe, pentothal bottle with tubing on syringe holder.	
17. Place needle and tubing in sterile towel on table.	Cover well.
18. Cover syringe with sterile towel.	Keep light away from solution to prevent decomposition.
19. Cover extra supply of pentothal sodium in medicine glass with sterile towel.	Cover well.
20. Have necessary stimulants and apparatus at hand.	1. Metrazol, coramin, caffeine 2. File 3. Sterile 2 cc. syringe 4. Patent airway 5. Oxygen—ALWAYS

HOW TO PROMOTE BETTER STUDENT-TEACHER RELATIONSHIPS

Elizabeth Coleman Blanchard, M.A.A.N.A.
Salem, Oreg.

The ultimate achievement of a student anesthetist and the satisfaction experienced by the teacher because of the student's success are gained in part by (1) the ability of the student to learn, (2) the ability of the instructor to teach, and (3) the effort each exerts to discharge her individual responsibility.

The teacher should first of all command the respect and co-operation of the student. To do this, she must be competent, just, friendly, and firm. In order to establish a fine association with the student, it is essential that the teacher always be courteous and exhibit a cheerful attitude. If she avoids a sarcastic and domineering manner, she will prevent a feeling of antagonism, which is a barrier to progress.

Discipline ought to have a just basis and should not be influenced by personalities. It is necessary that the teacher be alert against showing favoritism. Favoritism is often shown when not intended, and she should be on guard constantly to be loyal and fair to all students alike. Instructions must be given clearly and distinctly, and that directions are to be carried out as given should be emphasized.

Due regard must be paid the student's rights, her ideas, and her suggestions. The instructor should show an interest in the fact that the student has problems and be willing to help her in her individual difficulties. However, if a teacher helps *too* much, the student is restricted in action and her initiative is retarded. Rather, every effort should be made to increase her self confidence. Enthusiasm about the student's progress will produce good results. Everyone knows the encouragement in the words "well done," and it is important to the student that she receive from the teacher recognition for achievement. When criticism of the student's activity or procedure is in order, it is important that it be constructive and be given in a manner acceptable to the student.

In like manner the student should endeavor to command the respect of her superiors. This can be achieved by showing a spirit of co-operation, a desire for improvement, and persistent effort.

The happy, cheerful student is the one who will make the most of her opportunities. One who finds fault with little things creates discontent within herself as well as in those about her. To have a congenial atmosphere in which to work and learn, she must refrain from "petty griping." A spirit of co-operation should be made evident by her willingness to carry out assignments as given by superiors. It is necessary that the student learn not to assume responsibility beyond that which has been assigned her and to follow instructions in detail. She cannot shirk her duties if an agreeable relationship is to be maintained. She must be considerate of her co-workers and work in harmony with them.

A person who is rushed is in no frame of mind to learn or to carry out instructions properly when they are given rapidly, nor is an instructor at her best amid confusion. The student can avoid friction by making an effort to become proficient in the practice of procedures in a minimum of time.

Like the teacher, the student must be willing to admit to error when an error has been made. Progress is always made by doing so. It is also true that the student will benefit by, and should learn to accept, proper criticism.

The teacher and student must work together as a team, the teacher being conscious that it is *for* the student that she is teaching, and the student being aware that her full co-operation and effort must be given.

THE SENDING OF SENIOR STUDENTS TO INSTITUTIONS IN NEED OF ANESTHESIA SERVICE

Gertrude L. Fife, M.A.A.N.A.
Cleveland

In defining "need of anesthesia service," one must assume that it means illness of the regular staff of the hospital, war, disaster, or any circumstance which would make it advisable, for the continuation of anesthesia service in a city, to send students to another institution to perform those duties ordinarily performed by paid graduate anesthetists.

If students are sent to various institutions only when there is "need," the primary reason for so doing is to give service to the hospital, the quality of student training becoming a secondary consideration. If students' services are requested by institutions that are not facing a serious emergency, the question could rightfully be asked, "Why do you not set up a continuous affiliated training program in order that student training may be correlated and not subjected to periodic interruption?"

The school must accept the principle that student training comes first, and the hospital's obligation to the students it has accepted for training in anesthesiology should not be compromised.

The hospital requesting the student service may employ graduate anesthetists and may reason that the students will get good training under their supervision. This is not always true; the anesthetists on the staff may be excellent anesthetists, but it does not necessarily follow that they will be good teachers. Furthermore, if the hospital can provide adequate supervision of the student's work, it should not need the student service.

There are certain advantages, however, and for a proper conclusion to be reached, the advantages and disadvantages should be weighed. Weight should always be thrown on the side of student training. Otherwise the students are exploited, and the standards of the nurse anesthetist service are being lowered.

The advantages to the hospital are that (1) student services are available, (2) the anesthesia service is less costly, and (3) graduate anesthetists sometimes benefit by contact with students. There are also obvious disadvantages: (1) Part of the anesthesia service is at the student level; (2) in case of an accident, the hospital must assume responsibility for using students instead of graduate anesthetists; (3) frequent changes in personnel mean periodic interruption of the anesthesia service; (4) the schedule must be so arranged that the student can be relieved for classes; (5) strain is placed on the members of the graduate staff who are responsible for the student's work; (6) the surgeon may be dissatisfied with having a student on the case.

The advantages to the school are that more students may be admitted and that the school gains the good will

of hospitals in the city. These advantages are greatly outnumbered by the disadvantages: (1) To a certain extent, the school is responsible for the quality of the student's work possibly performed without adequate supervision; (2) fewer experienced anesthetists are available for clinical work and night duty; (3) the bulk of class work must be given to the student early in the course in order that she will have to return to the teaching hospital for a minimal number of classes; (4) the teaching hospital has little control over the technics used and the clinical experience obtained by the student in another hospital; (5) the teaching hospital also has little control over teaching methods or quality of teaching in another institution.

The advantages to the student are that (1) she has an opportunity to observe and put into practice technics not used in the teaching hospital, (2) she comes in closer contact with graduate anesthetists, and (3) with less supervision, she has the opportunity to develop self confidence. On the other hand, (1) with less supervision of the student's work and with less contact with those in the teaching field, careless and dangerous habits may be formed; (2) there is less correlation of basic training with clinical experience; (3) graduates in another institution are less interested in the student since they are not responsible for the quality of her work after her graduation; (4) frequent interruptions are necessary for the student to return to the teaching hospital for classes, and time is lost in transit; (5) the student may be dissatisfied with her training but be hesitant to discuss it with the director of the school of anesthesiology.

After an analysis of the advantages and disadvantages, it is evident that sending students to other hospitals is not a good policy unless the school can establish (1) a continuous teaching program and (2) an affiliation with a hospital in which the graduate anesthetists are interested in teaching and have the ability to teach and which is primarily interested in the student and her training and not in the service she can render.

The student should definitely not be paid for her services. She should be compensated, however, for expenses which she would not have had if she had remained on duty in the school. Allowing a student compensation for her services is being unfair to the other students. Moreover, in paying the student, the hospital is admitting the prime reason for using her services. Also if the student is paid, she will underestimate the value of the training offered. Training, if it is of the caliber it should be, should be paid for and will be appreciated from that standpoint.

ABDOMINAL SURGERY

(Continued from page 76)

inal wall, and any manipulation producing traction on the mesentery will result in pain and struggling and in tightening of the abdominal muscles. Although certain operations of moderate extent can be performed under local anesthesia or regional block, closure of the wound is commonly difficult and often impossible without the supplemental use of another agent. Therefore, the use of local anesthesia is best limited to operations of slight magnitude and to patients who are poor operative risks.

NOTES AND THE NEWS

An INSTITUTE FOR NURSE ANESTHETISTS is to be held at the Jung Hotel in New Orleans, May 26-30, under the auspices of the Council on Professional Practice of the American Hospital Association, the American Association of Nurse Anesthetists, the Louisiana Hospital Association, and the Louisiana Association of Nurse Anesthetists. This institute is being conducted to meet the need frequently expressed by individual nurse anesthetists for refresher study of the physiology of circulation and respiration as it is related to anesthesia. Scheduled for extensive discussion are the uses of intocostrin, endotracheal anesthesia, analeptic drugs, fundamental principles of chemistry, and gas therapy. A unique feature of the institute is that each person enrolled will have an opportunity to observe and perform experimental intubation of dogs. Among the distinguished persons on the faculty of the institute are Dr. John H. Seabury, assistant professor of medicine, Louisiana State University School of Medicine; Dr. John Adriani, assistant clinical professor of surgery, Louisiana State University School of Medicine; Dr. Chapman Reynolds, professor of pharmacology, Louisiana State University School of Medicine; Dr. Edgar Hull, professor of medicine, Louisiana State University School of Medicine, and Dr. Lewis E. Jarrett, director, Touro Infirmary.

Further information about the institute may be obtained from Dr. Hugh V. Hullerman or Miss Anne Campbell, 18 E. Division St., Chicago 10, Ill.

At the TRI-STATE ASSEMBLY OF NURSE ANESTHETISTS, to be held at the Palmer House in Chicago, Esther E. Edwards, president of the Wisconsin State Association of Nurse Anesthetists, will preside at the opening session on May 5. This session is scheduled for 3:45 p.m. in private dining room 14. After a call to order by Julia Baines, chairman of the assembly, greetings will be extended by Dr. Malcolm T. MacEachern, Opal Schram, president of the Illinois State Association of Nurse Anesthetists, and Lucy Richards, president of the American Association of Nurse Anesthetists. The following program will be presented:

"Mental and Emotional Problems of Anesthesia"
Jean Paul Pratt, M.D.
Henry Ford Hospital, Detroit

"Pentothal Sodium Anesthesia with Blind Intubation in Oral Surgery"
Wilfred S. Peters, D.D.S.
Peoria, Ill.

"Effects of Anesthesia upon Composition of Body Fluids"
Thomas C. McIntyre, M.D.
Grace Hospital, Detroit

Ione Wessinger, anesthetist at Henry Ford Hospital, Detroit, will preside at the session on May 6, scheduled for 3:45 p.m. in dining room 14. For this session the following program is planned:

"Laboratory Findings That the Anesthetist Needs to Know"
W. A. Chipman, M.D.
Detroit

"Anesthesia in Children, with Special Reference to Cardiac Surgery"
Willis J. Potts, M.D.
Children's Memorial Hospital, Chicago

"Barbiturates"
Walter Shriner, M.D.
Springfield, Ill.

"Curriculum and Examination Program"
Opal Schram, moderator
Janet McMahon
Eletta E. Silver
Anne M. Campbell

At the final session of the assembly, scheduled for 1:15 p.m. on May 7 in dining room 14, Marie Petrowske, president of the Indiana State Association of Nurse Anesthetists, will preside. The following program will be presented:

"Anesthesia Literature"
Florence McQuillen
Mayo Clinic, Rochester, Minn.

"The Brain and Anesthesia"
Frederic Schreiber, M.D.
Wayne University Medical School, Detroit

"Endotracheal Anesthesia from the Viewpoint of the Nurse Anesthetist"
Sr. Seraphia
St. John's Hospital, Springfield, Ill.

"Some Factors in Shock of Interest to Anesthetists"
John Keeley, M.D.
Mercy Hospital, Chicago

For an exhibit, a "Who's Who" display is being prepared by the Indiana Association, a miniature display by the Michigan Association, a history of anesthesia display by the Wisconsin Association, and an "Information Please" display by the Illinois Association.

Durable, practical, and very inexpensive HEADSTRAPS can be made from discarded inner tubes. Sister Rudolpha and Sister Seraphia of St. John's Hospital in Springfield, Ill., wrote in to tell us how it's done. After the inner tube is cut in the shape of a headstrap, the ends are perforated for hooking onto the gas mask; several perforations at each end make the strap adjustable.

The NEW ENGLAND ASSEMBLY OF NURSE ANESTHETISTS held its second annual meeting on Mar. 24-25 at the Hotel Statler in Boston in conjunction with the New England Hospital Assembly. The program opened with the showing of a teaching film on the "Administration of Pentothal Sodium." At a round table discussion on "Problems of Anesthesia," the topics discussed included the use of the laryngoscope and insertion of intratracheal tubes by the nurse anesthetist, use of cyclopropane and curare for children, choice of anesthetic agents for children with rheumatic heart disease, convulsions and ether anesthesia, use of helium with cyclopropane, cyclopropane for cesarean section, and use of pentothal sodium in dental cases. Sara Metzler of the Massachusetts General Hospital read a paper on "Anesthesia for Sympathectomies."

During the business session, the following officers were elected: president, Betty Lank, Children's Hospital, Boston; vice president, Elizabeth Welch, Maine General Hospital, Portland; secretary-treasurer, Elizabeth MacRae, Peter Bent Brigham Hospital, Boston; trustees, Ann Decker, Maine General Hospital, Portland; Elsie McKenzie, Grace Hospital, New Haven, Conn.; Gertrude Desantels, Bishop DeGoesbriand Hospital, Burlington, Vt.; Flor-

ence Hall, St. Joseph's Hospital, Nashua, N. H.; Jeanne Siegelman, 32 Woodhaven Rd., Pawtucket, R. I.

The program for the second day of the meeting was under the direction of the New England Hospital Assembly. Esther Myers Stephenson, president of the New England Assembly for Nurse Anesthetists, read a paper on "Co-ordination of Effort within the Department of Anesthesia." In a symposium on "Inhalation Therapy," Dr. Sidney C. Wiggin, director of anesthesia at Boston City and Faulkner Hospitals, discussed the organization of the department; Dr. Reginald Hunt, anesthesiologist at Newton-Wellesley Hospital, Newton, Mass., discussed equipment; Dr. Maurice S. Segal, assistant professor of medicine, Tufts College Medical School, discussed indications for the use of inhalation therapy.

Dessie Merle Cox, President
Arkansas Association of Nurse Anesthetists

Candidates who passed the QUALIFYING EXAMINATION given Nov. 11, 1946, will be listed in the membership list to be published in August.

ALABAMA. Mary Parks, president of the Alabama Association of Nurse Anesthetists, presided at a meeting of the association held on Mar. 29 at the Aust Tea Room in Birmingham. Officers elected were president, Alberta Boggan, 1014 Essex Rd., Birmingham; 1st vice president, Mechtildes Crowley, Medical College of Alabama, Birmingham; 2d vice president, Naomi Sinclair, Baptist Hospital, Birmingham; secretary, Mildred Crawford, St. Vincent's Hospital, Birmingham; treasurer, Myrtle Luckett, 607 Broadway, Birmingham. Robye Daves, East End Hospital, Birmingham, was made chairman of the membership committee. Nominations were made for officers of the American Association of Nurse Anesthetists, and plans were laid to have quarterly meetings and to take advantage of the facilities of the new University Medical Center in Birmingham.

ARKANSAS. Dessie Merle Cox, president of the Arkansas Association of Nurse Anesthetists, submitted this autobiographical sketch:

"Graduated from Baptist State Hospital School of Nursing, Little Rock, Arkansas. Shortly after graduation I accepted a position as surgical nurse and office nurse for a plastic surgeon in this city. After two years of this type of work, I took a post-graduate course in anesthesia at Charity Hospital in New Orleans, Louisiana. When I completed my course, I resumed work with the same surgeon, Ellery C. Gay, D.D.S., M.D., administering anesthesia instead of being a surgical nurse.

"March 1942 I entered the Army Nurse Corps, requesting overseas duty. I was assigned to the Second Auxiliary Surgical Group.

"At present I am doing private anesthesia in Little Rock, Arkansas. I have no special hobbies, but I do like to travel; however, the army almost fulfilled that desire."

ILLINOIS. The Illinois Association of Nurse Anesthetists held a meeting on Mar. 14 at 32 W. Randolph St., Chicago. Opal Schram, president of the association, reported the resignation of Anna Ronn as 1st vice president, and the appointment of Matilda Welenske, St. Joseph's Hospital, Chicago, to fill the unexpired term. It was also announced that no general meeting will be held at the time of the Tri-State Assembly. Catherine Gallagher introduced the guest speaker, Dr. William J. Kroger, formerly of the department of obstetrics and gynecology, University of Illinois Medical School, who read a paper on "Hypnosis."

KANSAS. According to the latest report, the Kansas State Association of Nurse Anesthetists has a membership of 19. Officers of the association are president, Ethel S. Paul, 544 N. Lorraine, Wichita; 1st vice president, Senja Mikkola, Wesley Hospital, Wichita; 2d vice president, Christina E. Howard, 1022 N. Topeka, Wichita; secretary-treasurer, Elma L. Kottal, 1022 N. Topeka, Wichita. Delegates appointed to attend the annual meeting in St. Louis are Ethel S. Paul and Elma L. Kottal.

MARYLAND. The Blalock-Taussig operation was televised at the Johns Hopkins Hospital on Feb. 28 and Mar. 1 for a large audience of surgeons representing the entire United States. This was the first application of television to the field of medicine. Olive Berger, chief nurse anesthetist, administered the anesthesia for the operation performed by Dr. Alfred Blalock, and Marion W. Thomas administered the anesthesia for the Blalock operation performed by Dr. William Longmire.

Marion W. Thomas, instructor of anesthesia at Johns Hopkins Hospital, spoke at a sectional meeting of the American College of Surgeons, held in Baltimore at the Lord Baltimore Hotel on Mar. 10-11, on "Emergencies Arising during the Administration of an Anesthetic." She discussed the subject from an administrative viewpoint and emphasized the need for having available equipment in good working order, in various sections of the hospital as well as in the operating rooms. Special attention was drawn to endotracheal equipment and replacement therapy.

MICHIGAN. At a meeting of the Michigan State Association of Nurse Anesthetists, held on Feb. 22 in the English Room of the Book-Cadillac Hotel, Dr. William Kirtland of Jefferson Clinic spoke on "Morphine and the Related Opiates." This address was followed by a paper on "Anesthesia in the Blalock Operation" read by Lenore Gribble of Henry Ford Hospital and a period of discussion.

As of September, 1947, the length of the anesthesia course at Mount Carmel Mercy Hospital, Detroit, will be increased from nine months to one year.

Gertrude McEveney Myers, director of the school of anesthesia of St. Mary's Hospital in Detroit since 1936, retired on Feb. 1. In reply to a request for an autobiographical sketch, Mrs. Myers wrote:

"I was born in Sault Ste. Marie, Michigan, and was educated there by the Ladies of Loretto at St. Mary's School and Loretto Academy. I first thought of a nursing career when I was seventeen and our family physician and neighbor complimented me on my nursing skill. My mother had an illness and I, the second oldest of a family of six, took over the sick room duties. St. Mary's Hospital School of Nursing was my choice of a training school. I graduated from there in 1917. During the first World War, I did emergency nursing at Camp Grant, Illinois.

"In 1923 I began my course in anesthesia at St. Mary's Hospital, and after I graduated in this course I assisted in teaching the small group of graduate nurses who formed here the first little school of anesthesiology in Detroit. In 1936 I reorganized the school and became the director. About 250 have been trained in this school.

"For ten years I have been a member of the A.A.N.A. and assisted in organizing the Michigan state association, serving as president for the past two years. On February 1, 1947, I retired having been 33 years at St. Mary's Hospital, 23 years of this time in anesthesiology."

Gertrude McEvency Myers

MINNESOTA. A meeting of the Minnesota Association of Nurse Anesthetists was held at St. Barnabas Hospital in Minneapolis on Feb. 25. Dr. Marjorie Anderson, chief anesthetist at Fairview Hospital, Minneapolis, gave an address on "Tubocurarine." At a meeting on Mar. 25 at St. Joseph's Hospital, St. Paul, films on "General Anesthesia for Children" and "Intocostrin" were shown by the Squibb Co. Plans for an institute to be held early in the fall were discussed, and an outline of the program for the annual meeting, to be held at the Radisson Hotel in Minneapolis on May 16, was presented.

On Jan. 16, Kathleen Cleary of St. Luke's Hospital, St. Paul, died. She was one of the first officers of the Minnesota Association of Nurse Anesthetists and remained active until a year ago. For 27 years she was an anesthetist at St. Luke's Hospital. During the year prior to her death, she was employed part time by both St. Luke's Hospital and Children's Hospital in St. Paul.

NEBRASKA. The tenth annual meeting of the Nebraska Association of Nurse Anesthetists was held on Jan. 14 at the Immanuel Deaconess Hospital in Omaha. Wilhelmina S. Gulotta presided. Mrs. Gulotta, who had served continuously as president since 1940, announced her retirement from office.

The guest speaker was Dr. William N. Hardman, director of Nebraska's first school of anesthesia at St. Joseph's Hospital in Omaha. He discussed the latest aids to anesthesia and supportive treatment and exhibited anesthesia equipment.

The following officers were elected: president, Dolores V. Broughton, Im-

Dolores V. Broughton, President
Nebraska Association of Nurse Anesthetists

manuel Deaconess Hospital, Omaha; vice president, Olga R. Schulz, Bryan Memorial Hospital, Lincoln; trustees, Ann Almquist, Sr. M. Nicasia, Amanda D. Inselmann, and Kathryn Svoboda. The May meeting of the association will be held at Lincoln General Hospital in Lincoln.

NEW JERSEY. The New Jersey State Association of Nurse Anesthetists will hold its annual meeting in conjunction with the New Jersey Hospital Association, May 15-16, at Hotel Dennis in Atlantic City. The May 15 session will begin at 1:30, and the May 16 session, at 2:00 p.m.

NEW YORK. On June 2-3 the thirteenth annual meeting of the New York State Association of Nurse Anesthetists will be held at the Hotel Pennsylvania in New York City. The morning sessions will be devoted to clinics and the afternoon sessions to scientific meetings. Requests for additional information about the meeting should be addressed to Alma Van Gordon, 428 Westminster Rd., Brooklyn 18, N. Y.

OHIO. From the Alumnae Association of University Hospitals School of Anesthesia in Cleveland, notice has been received of the death of Margaretta M. Northrup on Dec. 25, 1946, at Groton, Mass. Miss Northrup was graduated in 1912 from Anna Jacques Hospital at Newburyport, Mass., where she was later assistant superintendent of nurses. When the United States entered World War I, she volunteered for service in the army and served overseas for 23 months with Base Hospital No. 5. For her outstanding services, she was decorated by the Belgian, British, and French governments. Upon her return to this country, she trained as an anesthetist and quickly won recognition in this profession. She served as an anesthetist at the Santa Barbara Cottage Hospital in California and at Long Island College Hospital in Brooklyn, N.Y., where she worked for several years with Dr. Emil Goetasch, a thyroid specialist. In addition she assisted in research in anesthesia. Later she was an anesthetist at the Springfield Hospital in Vermont. Miss Northrup's character and devotion to her profession were an inspiration to all who knew her.

PENNSYLVANIA. On Apr. 23-24, the annual meeting of the Pennsylvania State Association of Nurse Anesthetists was held at the Hotel William Penn in Pittsburgh. At the session on Apr. 23,

Josephine Horvatincic, anesthetist at Allegheny General Hospital, Pittsburgh, presided. The address of welcome was given by Madeleine M. King, president of the Pennsylvania association. Greetings were extended by Esther J. Tinsley, president of the Hospital Association of Pennsylvania, and by Lucy Richards, president of the American Association of Nurse Anesthetists. Papers read at this session were:

"Choosing an Anesthetic for the Thyroid Patient"
Horace E. Dewalt, M.D.
Allegheny General Hospital, Pittsburgh

"Intravenous Premedication"
James A. Zewe, M.D.
St. Joseph's Hospital, Pittsburgh

"The Role of the Anesthetist in the Prevention of Shock during Surgery"
L. M. Moneheim, D.D.S.
University of Pittsburgh Dental School

"The Role of the Anesthetist in Obstetrics"
Brainard O. Hawk, M.D.
Allegheny General Hospital, Pittsburgh

On the morning of Apr. 24, a clinic was conducted at the Allegheny General Hospital and was followed by a business meeting of the state association. At the afternoon session, Mary Roenbaugh, anesthetist at Western Pennsylvania Hospital, Pittsburgh, presided. The program included:

"The Use of Curare in Anesthesia"
Harry W. Bowman, M.D.
Allegheny General Hospital, Pittsburgh

"Sympathomimetic Drugs"
Ira W. Flanberg, M.D., moderator
Irene Shank, M.D.
G. B. McMasters, M.D.
M. A. Cambest, M.D.
L. M. Moneheim, D.D.S.

On Jan. 2, after nearly two years of illness, Naomi McAfee Schramm, died in her own training school, Beaver Valley General Hospital, New Brighton, Pa. Mrs. Schramm had been a member of the association since 1936.

TENNESSEE. At the annual meeting of the Tennessee Association of Nurse Anesthetists, held in the Georgian Room of the Hotel Peabody, Memphis, on Feb. 12, the following officers were elected: president, Archie Hobson, Knoxville; 1st vice president, Theresa Trail, Memphis; 2nd vice president, Antoinette Rossi, Memphis; secretary, Terry Shenep, Memphis; treasurer, Martha Belew, Memphis; trustees, Linda Bailey, Memphis (1948), Ruthie Hawne, Memphis (1949), Hattie Vickers, Nashville (1950), Ora Clarke, Nashville (1951). An invitation was extended by Archie Hobson for the annual meeting of 1948 to be held in Knoxville. After discussion, it was decided to continue to hold the state meeting in Memphis, since it is held in conjunction with the Mid-South Assembly each year. It was voted to purchase a $1,000 war bond, and the treasurer was instructed to make the purchase.

From Archie Hobson, president of the Tennessee association, we received this autobiographical note:

"As to my life as an anesthetist, I graduated as a nurse at Knoxville General Hospital. Had charge of surgery there for a few years before going to Mayo Clinic for anesthesia . . . on anesthesia staff there from '28 to '31. I was resident anesthetist at St. Mary's Hospital, Knoxville, Tenn. for 3 years. Since that time I have been associate anesthetist here at Fort Sanders Hospital, Knoxville, that is, I give anesthetics all over the city but am on call at Fort Sanders Hospital for cases. I have given all anesthetics at Crippled Children's Hospital, Knoxville, since it opened about 12 years ago, gratis. I guess that comes near being my hobby . . . doing for and making

Archie D. Hobson, President
Tennessee Association of Nurse Anesthetists

the crippled children happy. Anyway I get lots of satisfaction from it."

TEXAS. The eleventh annual meeting of the Texas Association of Nurse Anesthetists was held Mar. 27-29 at the Rice Hotel in Houston. The opening session was held with the Texas Hospital Association. The speakers were Homer Wickenden, whose subject was "The Pension Program of the American Hospital Association," and Everett Jones, who gave an address on "The Future of the Voluntary Hospital." In the afternoon a tea in honor of Lucy Richards, president of the American Association of Nurse Anesthetists, was given at the home of Golden B. Peterson.

On Mar. 28, Ora Lee Mercer, anesthetist from Ft. Worth, presided at the morning session. A report from the American Association of Nurse Anesthetists was given by Lucy Richards. This was followed by a paper on "Sodium Pentothal in Obstetrics" read by A. L. Dippel, M.D., professor of obstetrics, Baylor University School of Medicine, and a film from the Abbott Laboratories on "Pentothal Sodium." At the luncheon meeting, Marcella Maroney, anesthetist from Houston, presided, and Helen Douthitt, assistant professor of social sciences, University of Houston, discussed "How a Bill Becomes a Law." The presiding officer for the afternoon session was Rena Sterling, anesthetist from Herman Hospital in Houston. At this meeting, L. F. Schuhmacher, M.D., professor of anesthesia, Baylor University School of Medicine, spoke on "Continuous Spinal Anesthesia," Esther W. Coleman, anesthetist at Scott & White Hospital, Temple, on "Curare in Anesthesia," and Sadie J. Brown of the Texas Graduate Nurses

Jessie Compton, President
Texas Association of Nurse Anesthetists

Association, on "Why You Should Belong to Your Nursing Organizations." At a banquet with the Texas Hospital Association, John H. Hayes gave an address on "The Changing Tides in the Management of Hospitals."

At the session on Mar. 29, the presiding officer was Dorothy Headley, Methodist Hospital, Ft. Worth. The opening address was given by Thomas H. Head, president-elect of the Texas Hospital Association. Other speakers were James Greenwood, Jr., M.D., chief of neurosurgery, Hermann Hospital and Methodist Hospital, Houston, whose subject was "Anesthesia in Neurosurgery and Effects of Different Agents on the Brain," and E. W. Bertner, M.D., director of Texas Medical Center, who gave a "Report on the Texas Medical Center." A round-table discussion was then conducted by Helena Russell, anesthetist at Jefferson Davis Hospital, Houston.

Officers elected were president, Jessie Compton, Methodist Hospital, Dallas; vice president, Laura Hoffman, Ft. Worth; secretary-treasurer, Mrs. Jack K. Childress, Temple; trustees, Alvena Fletcher, Clifton, and Virginia Futch, San Angelo.

WISCONSIN. A meeting of the Wisconsin Association of Nurse Anesthetists was held in the staff room at St. Mary's Hospital, Racine, on Feb. 8. Esther Edwards, president, presided. Announcement was made of Nominating Committee and Finance Committee appointments: Nominating Committee, Mabel Johnson, chairman, Jessie Opdale, and Leone Bridenhagen; Fi-

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nance Committee, Leone Theilen, chairman, Hazel Reed, and Melva Werking. A letter from Marie Kraft concerning national information of impending legislation and accompanying forms were shown to the members. At a previous meeting of the board of trustees, a motion was made to adopt the legislative mailing service. The secretary read a letter from the Executive Office concerning registration in the Wisconsin association of male nurses who are trained anesthetists. The president requested the secretary to write Ruth Bergman, Minneapolis, concerning male nurse anesthetists. Eletta E. Silver was appointed to investigate the establishment of a refresher course in anesthesia for Wisconsin anesthetists.

METABOLISM

(Continued from page 80)

thyrotoxic crisis, may destroy ¼ gr. morphine in one or two hours, whereas in a patient with a low metabolic rate, an aged patient, for example, 1/6 gr. may be effective for six to eight hours.

Atropine is a direct stimulant to metabolism. When balanced with morphine, however, this action of atropine is somewhat counteracted. It is proposed that morphine ¼ gr. plus atropine 1/150 gr. produces about the same metabolic depression as morphine 1/6 gr. without atropine.

According to Cushny, the cessation of many ordinary movements incident to the administration of curare reduces the metabolic rate of the patient.[5]

The basal metabolic rate is abnormally high in patients with hyperthyroidism and is high in those with tuberculosis, diabetic acidosis, and cardiac decompensation, what Wiggers calls "decompensated stages of heart disease."[4] Since elevation of basal metabolic rate is associated with a corresponding elevation in basal oxygen consumption rate, patients with hyperthyroidism or tuberculosis obviously need a high oxygen supply.

Scopolamine is a direct stimulant of metabolism and in premedication reduces metabolism only to the degree that it reduces emotional excitement, the latter action being somewhat offset by its directly stimulating action on metabolism. Scopolamine markedly inhibits secretion of mucus. When scopolamine is used in properly balanced doses with morphine, the metabolic rate is lowered, and anesthesia is facilitated. However, when scopolamine overbalances the morphine, the metabolic rate is increased, and induction and conduct of the anesthesia are rendered more difficult.

Summary

The preanesthetic metabolic rate of a patient gives a clue to the margin of oxygenation that must be provided during the anesthesia. It thereby denotes the potency of the anesthetic agent required. Metabolic rate may be favorably influenced by appropriate preanesthetic medication.

Dues for the current year were payable before Mar. 1. Members failing to pay dues by that time are liable to a $3 penalty fee. Members of organized state associations remit their dues to the treasurer of the state association. Members not affiliated with an organized state association remit their dues to the Treasurer's Office of the American Association of Nurse Anesthetists, 18 E. Division St., Chicago 10, Ill.

5. Ibid.

4. Loc. cit.

ABSTRACTS

Ramsey, Helen, and Haag, H. B.: Synergism between the barbiturates and ethyl alcohol. J. Pharmacol. & Exper. Therap. **88:**313-322, Nov., 1946.

The LD50 of sodium seconal given orally to mice was 140 mg./kg.; when it was administered with alcohol (4.2 cc. 95 per cent per kg.) the LD50 was lowered to 105 mg./kg. The presence of 4.2 cc. of 95 per cent alcohol/kg. increased the per cent mortality from standard oral doses of sodium seconal, sodium pentobarbital, and sodium barbital in mice. The anesthetic dose of pentothal sodium for dogs was reduced from 10.9 to 6.9 mg./kg. by previous oral administration of 1.5 cc. 95 per cent alcohol/kg. and from 10.2 to 5.3 mg./kg. by 3 cc. 95 per cent alcohol/kg. Duration of anesthesia after injection of pentothal sodium was greatly increased in the presence of alcohol. The minimal anesthetic doses of pentothal sodium given one, two, and three hours after alcohol were not strikingly different. Duration of anesthesia was greatest when a fixed dose of pentothal sodium was given one hour after, and least when given three hours after, alcohol. Onset of anesthesia from injection of sodium barbital appeared to be delayed by the presence of alcohol. Duration of anesthesia from the injection of sodium barbital was materially increased by the presence of alcohol. The disposition of alcohol in the body did not appear to be influenced by the presence of sodium barbital. Conversely, the blood level of sodium barbital was not altered by the presence of alcohol. Picrotoxin was less efficient as an analeptic in rabbits given sodium pentobarbital plus alcohol than in those given sodium pentobarbital alone.

Burstein, C. L.: Misuse of adrenalin and coramin. Am. J. Surg. **73:**101-103, Jan., 1947.

General anesthesia alters the effects of certain drugs. Untoward reactions, often fatal, have been produced during general anesthesia by the use of drugs which are known to be therapeutically efficient in the unanesthetized state. The cardiac conducting mechanism becomes sensitized during general anesthesia, and with certain agents, particularly chloroform and cyclopropane, this sensitization is so great that subtherapeutic doses of adrenalin injected into the circulation may cause ventricular fibrillation and death. In cases of cardiovascular collapse adrenalin injected into the heart *during anesthesia* has proved fatal in every report encountered by the author. Adrenalin used locally for its vasoconstrictor action to aid hemostasis in the operative field is another serious misuse of the drug during general anesthesia.

Coramin also shows varied effects depending on whether it is used in an unanesthetized or an anesthetized subject. The administration of coramin to a subject anesthetized with a barbituric acid derivative aggravates rather than diminishes respiratory and circulatory depression.

Resuscitative measures are best restricted to artificial respiration by the administration of oxygen through an endotracheal tube connected to a breathing bag with carbon dioxide absorption. Whenever applicable, manual cardiac massage is of definite worth. The use

of procaine intravenously, instead of adrenalin, is suggested in cases of cardiovascular dysfunction due to cardiac hyperirritability.

Miquel, Ovidio: Effect of choloroform and ether on the activity of cholinesterase. J. Pharmacol. & Exper. Therap. **88:**190-193, Oct., 1946.

Several attempts have been made to explain the parasympathetic phenomena associated with general anesthesia through an action on cholinesterase. As a result of controlled experiments, the author found that ether and chloroform in concentrations corresponding with those attained during deep general anesthesia do not inhibit the activity of cat serum cholinesterase in vitro. In cats the cholinesterase activity of the serum during deep anesthesia was not depressed. Ether and chloroform in concentrations higher than those that occur in blood during deep anesthesia inhibit cholinesterase in vitro. The action of ether in the high concentration used is partly reversible. These observations, while not conclusive, support the hypothesis that the parasympathetic effects observed during general anesthesia from ether and chloroform are not due to the inhibition of cholinesterase.

Lorhan, P. H., and Mosser, Donn: Phenylpropanolamine hydrochloride: A vasopressor drug for maintaining blood pressure during spinal anesthesia. Ann. Surg. **125:**171-176, Feb., 1947.

Phenylpropanolamine hydrochloride has a greater pressor effect than ephedrine with the same duration of action, but does not undesirably stimulate the central nervous system. Unlike epinephrine the compound does not potentiate cardiac irritability. The prolonged pressor activity of the compound without cardiac excitation or a secondary fall in blood pressure and without central nervous system stimulation makes it most useful. In an investigation to determine the influence of phenylpropanolamine hydrochloride on the blood pressure in the presence of a spinal anesthetic, the optimal effective dose was found to be 50 mg. administered intravenously. This dose maintained the blood pressure at preoperative levels in 90 per cent of 263 patients subjected to 280 operations. The vasopressor effect of phenylpropanolamine hydrochloride compares favorably with the action of epinephrine, ephedrine, and neosynephrin. It has the advantages of more prolonged action without either the sharp rise or fall of blood pressure which usually follows the administration of epinephrine, a more prolonged action than that of neosynephrin, and less frequent excitation than that encountered with ephedrine.

Harris, H. E., Lewis, R. O., and Hale, D. E.: Use of curare and pentothal sodium in endoscopy. Cleveland Clin. Quart. **14:**90-93, April, 1947.

Since one of the first actions of curare is to relax the muscles of the pharynx and the neck, the authors used curare-pentothal sodium anesthesia in 50 patients in whom difficulty in obtaining relaxation or co-operation was either anticipated or encountered. In no case did laryngospasm or cessation of respiration occur. Vomiting did not occur either during or after the procedure. After premedication and topical anesthesia, the curare is given. Pentothal is then administered before the maximal effect of the curare has taken place to prevent the patient's having a choking sensation when muscles of the pharynx and neck are paralyzed.

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BOOK REVIEWS

Woman as Force in History: A Study in Traditions and Realities. By Mary R. Beard. 369 pages. New York: Macmillan Company, 1946. $3.50.

This volume is a study of the tradition that women were members of a subject sex throughout history. That women have been a force in history has been shown by the part they took with men in distant and recent legal, economic, religious, social, intellectual, moral, philosophic, political, and military history. Women often have perpetuated the fallacy of women's subjection. Men who discuss human affairs often do so with an ambiguity so vague that one cannot be sure whether they are referring to men only or to both men and women. They may claim that they use the words "man" and "men" in the generic sense if they are charged with forgetting women. Confusion surrounds the use of the word "man" throughout history. Little attention has been paid to this linguistic problem. Some writers have reckoned with the force of women in history. Often, however, women are ignored or mentioned only casually. Recently, some writers of social history have gradually begun to recognize that women have been *in* history and have done something in the *making* of history.

In searching for the origin of the myth of women's subjection, one encounters near the middle of the nineteenth century two facts: 1. American women who were in rebellion against what they thought were restraints on their liberty first gave the idea its most complete and categorical form. 2. They most often cited, in support of the idea, Sir William Blackstone, author of *Commentaries on the Laws of England*. The chapter entitled "Of Husband and Wife" was quoted by insurgent women in America. That many of the statements in this chapter had been modified in women's favor by courts of equity as well as new American laws was overlooked by the feminists. Several chapters are devoted to explaining and dispelling the fantasy of women's legal subjection. Other chapters are devoted to an elucidation of women's progress in medieval economic, social, and intellectual life and to the correlation of that progress into a force for the "realization of the noblest ideals in the heritage of humanity."

Throughout the text are many bibliographic references of works on women in history. These are not repeated in a bibliography at the end of the text, which lists selected references from the resources of American libraries. This list is illustrative of the large number of references to woman in history, a subject as large as that of man in history. An index completes the volume.

A Memoir to the Academy of Sciences at Paris on a New Use of Sulphuric Ether. By W. T. G. Morton. 24 pages. New York: Henry Schuman, Inc. $1.50.

The ether centennial was the occasion for the publication of the reprint of Morton's letter to the Academy of Sciences of Paris in support of his claims in regard to the introduction of ether. A foreword, written by John F. Fulton, explains the purpose of the original letter and prepares the reader for appreciation of the text. This de-

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*A Clinical Study of Carbon Dioxide Absorption During Anesthesia . . . Major Lloyd H. Mousel, Captains William A. Weiss and Luther A. Gilliom; Medical Corps, AUS . . . *Anesthesiology, Vol. 7, No. 4, pp 375-398, July 1946.*

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fense of Morton's position in relation to the discovery of the surgical use of ether gives the reader some insight into the character of the author and the problems which he encountered in trying to establish his claims.

Anaesthetic Methods. By Geoffrey Kaye in collaboration with Robert H. Orton and Douglas G. Renton. 706 pages, 188 illustrations. Melbourne, Victoria: Ramsey (Surgical) Pty. Ltd., 1946.

This book has been written primarily for the use of the nonspecialist anesthetist. Emphasis has been placed on the conditions of practice which prevail in Australia. Some chapters, such as that which deals with the relationship of the anesthetist and the law, would be valid only in countries in which English common law applies. Nevertheless, there is much valuable material, even in that chapter, for any anesthetist.

The mechanical side of anesthesia has been emphasized. Semidiagrammatic illustrations have been used instead of photographs of apparatus for the purpose of presenting a clearer picture of the construction of various devices. The 35 chapters cover a wide list of subjects. History and theory are briefly reviewed. Respiration, with the relation of oxygen and of carbon dioxide, circulation, and elimination precede the discussion of anethesia signs. The care of the patient is thoroughly discussed, as are the risk, the choice of anesthetic, and premedication. The anesthetic agents and the methods of their administration are considered. Where divergent views might exist, the authors have chosen to express their own opinions rather than confuse the reader. In the chapters explaining the clinical application of various agents and methods, charts are used to illustrate the points in question.

A chapter on the emergencies of anesthesia and another on death under anesthesia are probably more frankly presented and more instructive than is usual in books on anesthesia. Sequelae of anesthesia are considered with suggestions for their prevention and treatment. Special chapters on anesthesia for dentistry, midwifery, oxygen therapy, blood transfusions, fires and explosions, and anesthesia records indicate the comprehensive nature of this book. Since in Australia local analgesia does not usually lie within the province of the anesthetist, there is no account of this subject. Spinal anesthesia, however, is commonly included in the anesthetist's practice; therefore, a chapter on this method is included.

Recently introduced methods, including the use of curare and refrigeration, are discussed in an appendix. An outline of apparatus for private practice and useful data, such as conversion tables for weights, measures, and temperatures, equivalent strengths of solutions, and specifications for anesthetic apparatus, make up the second and third appendices. A bibliography, with short comments by the authors, lists the main English literature on anesthesia for the past 10 years. Marginal references indicate the sources of material, and these sources are listed at the end of the text.

The indices of quoted authors and subjects complete the volume. The material is well organized and presented in a usable manner. With a realization by the reader of the limitations imposed by the local conditions in a few instances, the book should be valuable for the study of the fundamentals of anesthesia.

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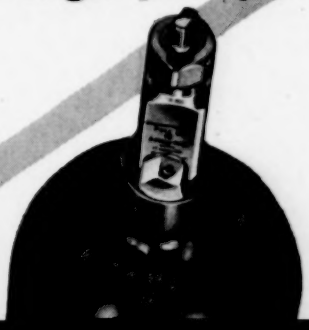

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